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ABSTRACT

This report contains the recommendations of the Advisory Committee on Program and Cost Effectiveness to the California State Board of Education. The committee was established by the California legislature for the purpose of developing a methodology for evaluating the cost effectiveness of various Federal and State educational projects. The report defines cost effectiveness as a management decision process that allows the decisionmaker to choose from among feasible alternatives on the basis of least costs and maximum program output as measured by student achievement. Five components were deemed to be essential to the development of a methodology for determining the cost effectiveness of educational programs: establishment of terminal objectives by grade for each program, measurement of pupil achievement in relation to specified objectives, determination of student characteristics that affect learning, identification of costs, and development of a system for the documentation of all program elements. The experience of the committee has convinced its members that it is indeed possible to develop a methodology for the assessment of the cost effectiveness of educational programs. A bibliography is included at the end of the report. (Author/DN)

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PROGRAM

and

COST EFFECTIVENESS

for

EDUCATION IN CALIFORNIA

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A Study by the Advisory Committee on Program and Cost Effectiveness for the California State Department of Education and the California State Legislature

EA 006 581

FINAL REPORT

of the

ADVISORY COMMITTEE ON PROGRAM AND COST EFFECTIVENESS

as established by the

Education Improvement Act (AB 606)

of the

California State Legislature

of 1969

March 1972

August 1, 1972

The Honorable Wilson C. Riles
Superintendent of Public Instruction
California State Department of Education
721 Capitol Mall
Sacramento, California 95814

Dear Dr. Riles:

It is my pleasure to submit to you the second and concluding report from the Advisory Committee on Program and Cost Effectiveness. This is a final report only because of the termination of this committee in accord with the provisions of AB2800, not because the assigned task has been completed.

The conclusions reached were those of informed lay citizens, who attempted to tap many sources of professional education, finance and business knowledge and opinion in California and to take account of the concerns of all Californians for the improved evaluation of education for California's children and youth and the resultant improved use of tax monies.

Our report, therefore, is a mixture of lay and professional judgment. The recommendations should be regarded as broad principles for the direction of cost effectiveness in public education. Any implementation effort will need the continuing attention of the Board, the Department of Education, the Legislature and the education communities.

The Committee of Nine was announced March, 1970. It has devoted long hours to its work and as personal situations changed, several members were obliged to withdraw. The Committee wishes to thank the State Department of Education for its increasing assistance and cooperation in this endeavor.

By submitting this Final Report and with the passage of AB2800, the Advisory Committee on Program and Cost Effectiveness has completed the charge it received from the State Legislature and the State Board of Education.

With our sincere thanks for the opportunity to serve the people and children of California, we remain,

Very sincerely,

Alvin L. Rosenthal, Chairman

Members: John A. Geddes, Vice Chairman
Allen S. Ginsburgh
Donald E. Kitch
Lewis T. Kohler
Agnes S. Robinson
Clarence R. Newby

cc: President
State Board of Education

MEMBERSHIP

ADVISORY COMMITTEE ON PROGRAM AND COST EFFECTIVENESS
Appointed March 1970 by State Board of Education

ALVIN L. ROSENTHAL, Chairman

Members from Business Management

Morris E. Currey (resigned May 1971) - Van Nuys
Allen S. Ginsburgh - Santa Ana
Leo A. Newsome (resigned November 1970) - Fountain Valley

Members from Economics and Finance

Dorothy Dehr (resigned June 1970) - Sacramento
Lewis T. Kohler, Ed.D., LL.D.(Hon.), R.S.B.A. - North Hollywood
Clarence R. Newby, C.P.A. - San Bernardino
Alvin L. Rosenthal, C.P.A. - Compton

Members from the Learning Sciences

John A. Geddes, Ph.D. - San Diego
Donald E. Kitch - Sacramento
Agnes S. Robinson, Ed.D. - Sacramento

CALIFORNIA STATE DEPARTMENT OF EDUCATION

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Mr. William Bronson (July 1971 - March 1972)

Mrs. Gloria Williamson (March, May 1970)

Mrs. Phyllis Little (April, June, July 1970)

Mrs. Diane Anheier (August 1970 - February 1971)

Mrs. Elaine Smith (March 1971)

Mrs. Florence Kugel (April 1971 - September 1971)

Mrs. Rose Marie Farnsworth (September 1971 - March 1972)

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WILSON RILES
Superintendent of Public Instruction
and Director of Education

STATE OF CALIFORNIA
DEPARTMENT OF EDUCATION
STATE EDUCATION BUILDING, 721 CAPITOL MALL, SACRAMENTO 95814

February 23, 1972

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The Honorable Wilson C. Riles
Superintendent of Public Instruction
California State Department of Education
721 Capitol Mall
Sacramento, California 95814

Dear Dr. Riles:

I am pleased to submit to you the final report from the Committee on Program and Cost Effectiveness. This is a final report only because of the termination of this committee in accord with the provisions of AB 2800, not because the assigned task has been completed.

This report is a brief summary of the work done by the committee since its inception in March 1970, and contains our conclusions and recommendations for work yet to be done. A more complete documentation of the work of the committee is being prepared for those who wish to examine in more detail the rationale and activities that have led us to the conclusions expressed in this report.

The committee has been composed of three members representing business management, Mr. Morris Currey (resigned May 1971), Mr. Allen Ginsburgh and Mr. Leo Newsome (resigned November 1970); four members representing economics and finance, Mrs. Dorothy Dehr (resigned June 1970), Dr. Lewis Kohler, Mr. Clarence Newby, C.P.A. and Mr. Alvin Rosenthal, C.P.A.; and three members from the learning sciences, Dr. John Geddes, Mr. Donald Kitch and Dr. Agnes Robinson. As chairman I am indebted to them for their time and conscientious labor.

The committee wishes to thank the State Department of Education for its assistance and cooperation in this endeavor.

Respectfully submitted,

Alvin L. Rosenthal, Chairman
Advisory Committee on Program
and Cost Effectiveness

REPORT TO THE STATE BOARD FROM THE ADVISORY COMMITTEE ON PROGRAM AND COST EFFECTIVENESS

The Legislature established the Committee on Program and Cost Effectiveness by the passage of AB 606 (California Legislature, 1969) and defined its charge in AB 1923 (California Legislature, 1970). The charge reads as follows:

> *"The Advisory Committee on Program and Cost Effectiveness shall develop and recommend to the State Board of Education a methodology for evaluating the cost effectiveness of projects financed by Titles I and III of the Elementary and Secondary Education Act of 1965, Miller-Unruh Basic Reading Act of 1965 . . . "*

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DEFINITION OF COST EFFECTIVENESS

Cost effectiveness is a term that has been used to describe several different, and sometimes conflicting, concepts. In the context of this report, cost effectiveness has been defined as a management decision tool which allows the decision maker to choose from among feasible alternatives on the basis of least costs and maximum program output as measured by student achievement. This may take the form of a ratio or index which can be used to compare costs for achieving the same objectives by the use of different programs.

POTENTIAL BENEFITS

The potential benefits to education that could result from the completion of the methodology started by this committee would include the capability to make decisions based

on:

1. The relative cost effectiveness of programs with the same objectives when a cost effectiveness index has been developed.

2. Objective data related to costs of programs and program elements.

3. Objective data related to the effectiveness of different programs with the same objectives.

4. The impact of a program on different student populations.

5. Staffing requirements in terms of teacher characteristics, skills or teaching styles required.

6. The evaluation of different instructional strategies.

7. The results of replicating successful programs or program elements in other locations.

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COMMITTEE ACTIVITIES

Committee activities for the first year of operation were reported to the Board in May 1971, at which time five components were identified which were deemed to be essential in the development of a methodology for determining the cost effectiveness of educational programs. These five components were:

1. Establishment of terminal objectives by grade for each program to be assessed.

2. Measurement of pupil achievement in relation to the specified objectives of the program.

3. Determination by appropriate research methods of the student characteristics which affect the learning rates of pupils.

4. Identification of costs, both direct and indirect, or programs and program elements.

5. Development of a system for the documentation of all program elements such as course

content, instructional strategies, staffing, inservice education, etc.

A more complete description of these components was given in this committee's report to the State Board dated May 25, 1971.

The report concluded that it was the opinion of the committee that without the development of these constituent parts, a model, as such, could not be developed.

During the second year the committee attempted to develop and test these components. In July 1971, in order to provide a working laboratory in which to try out some of the concepts contained in these components, the committee negotiated with the Riverside Unified School District to operate a reading and mathematics program in grade 7 at the Central Junior High School. This was a program Riverside operated at the school during the school year 1969-70 under the provisions of AB 938, the Demonstration Program in Reading and Mathematics, and the same source was used to fund this program for the second time. It was the intent of the committee that in the operation of the project, Riverside would collect data appropriate to each of the five components that had been identified by the committee and document carefully all aspects of the program and its implementation. This would enable the committee to test the feasibility of gathering these types of data at the school and classroom levels. It would also provide additional data for the study of student characteristics affecting the learning rate of different groups of students as well as data indicating the potential importance of measurable teacher characteristics. Also, since Riverside previously

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operated this same program, the degree of replication could be documented, as there would be a basis for comparison with the original version. The program involves the total grade 7 population of approximately 370 pupils at Central Junior High School in the subject areas of reading and mathematics, and includes the Chairmen of the English and Mathematics Departments, eleven teachers, teacher aides, tutors and staff time from the business office and Research and Evaluation unit. A budget of $84,469 was approved to cover actual costs over and above regular program expenditures. This project is currently in operation and is scheduled to run through the 1971-72 school year.

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CONCLUSION

The experience of the committee over the past two years has convinced its members that it is indeed possible to develop a methodology for the assessment of the cost effectiveness of educational programs.

The methodology as presently conceived by the committee would require definable program elements including objectives, measurement methods and a full description of such areas as subject content and teaching strategies; any measurable or definable teacher characteristics or teaching styles; any measurable student characteristics that affect the learning rate of different students; program costs down to the units within the classroom.

Before such a methodology may be completed, a number of tasks remain to be accomplished. Work could proceed

independently on the first four recommendations listed below, but before the last two could be completed, it would require the stabilizing of program content and implementation procedures to ensure comparability of programs.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion No. 1

Valuable data are being collected in the Riverside project and will become available following the close of the school year 1971-72.

Recommendation No. 1

Upon receipt of the final report from the Riverside project, the findings and conclusions should be carefully studied and incorporated into the development of the proposed model.

Conclusion No. 2

Programs must have the same objectives if they are to be compared for relative effectiveness.

Recommendation No. 2

If programs are to be compared, they must have the same objectives and be measured by the same instruments. In order to broaden the base for program comparison, it is recommended that when the Board adopts a curriculum framework, objectives for that framework and appropriate instruments to measure those objectives should be identified concurrently.

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Conclusion No. 3

When a successful program has been identified, it is possible to replicate that program in another location.

Recommendation No. 3

It is recommended that research be undertaken to identify the elements of a program of instruction that need to be compared in order to determine if two programs are the same or different, and that a format be developed for the collection of data appropriate for the elements identified. It is further recommended that procedures for data collection and program replication be field tested until it has been experimentally established that the proper data are being transmitted and the proper procedures are being used in the process of replication so that a successful program being operated in one district may be duplicated in another district without significant distortion of the original program.

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Conclusion No. 4

It is possible to develop a cost accounting system that will allow an analysis of costs down to the level of units within a classroom.

Recommendation No. 4

The accounting system developed for the Riverside project should be examined, revised as needed, and further field tested in order to ensure that the system is generally applicable to other districts and that it is collecting the kinds

of data required for replicating programs and comparing relative costs.

Conclusion No. 5

With a given program, it is possible to calculate and subsequently predict the varying impact or effectiveness of that program on student populations of varying backgrounds or characteristics.

Recommendation No. 5

When the replication process has been tested sufficiently to ensure duplication of a program without significant distortion, a successful program should be applied to a sample of student populations. This sample must be representative of the total state in regard to each of the variables identified as characteristics which affect the learning rates of pupils. The responses of students with particular characteristics to a program of known dimensions could be treated statistically to forecast the effects of this particular program on other students with these same characteristics.

Conclusion No. 6

It is possible to predict the relative impact a known program will have when implemented by teachers with varying backgrounds or characteristics.

Recommendation No. 6

It is recommended that research be undertaken to identify

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teacher characteristics or teaching styles that enhance or inhibit the ability to successfully implement particular educational programs, and that these results be either defined as an important element in the program description or incorporated in the model for the assessment of cost effectiveness.

FUTURE SUPPORT

It is the final recommendation of the Committee on Program and Cost Effectiveness that the State Board of Education exercise leadership in the further development of the concepts presented by the committee and that sufficient manpower and financial resources be provided to ensure the completion of this methodology for the assessment of program and cost effectiveness within a reasonable length of time. The committee has made a recommendation to the State Superintendent of Public Instruction that a specific work group be formed within the Office of Program Evaluation of the State Department of Education for the purpose of continuing the work of the committee.

Alvin L. Rosenthal, Chairman
John A. Geddes, Vice-Chairman
Allen S. Ginsburgh
Donald E. Kitch
Lewis T. Kohler
Clarence Newby
Agnes S. Robinson

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LEGISLATION AND LEGISLATIVE INTENT

AB 606 of the California State Legislature, 1969, contained a chapter known as the Educational Improvement Act of 1969.

It was the intent of the Legislature that funds provided through several specified sources be spent in the most effective way possible and have cost effective measures employed in their approval and evaluation. Program achievement and cost effectiveness were to be assessed annually. Highly effective projects were to be extended to further use within the district where it was originated as well as in other districts, while less effective projects were to be replaced with ones of proven effectiveness or by new promising projects.

The effectiveness of a project was to be measured in terms of the objectives of the project which were to be primarily concerned with the pupil's improvement in ability to read, to use and understand the English language and to use and understand the concepts of mathematics.

An important part of the Educational Improvement Act was the creation of an Advisory Committee on Program and Cost Effectiveness. This Committee was to be appointed by the State Board of Education and was to consist of three public members representing the field of economics, three public members representing the learning sciences and three public members representing the managerial sciences. The role of this Committee was to advise the State Department of Education and the State Board of Education on projects to be approved and the administration of the several specified acts. The Committee was also to assist in the evaluation of the program achievement of projects, the relative cost effectiveness of projects and in the selection of projects which should have expanded use or which should be modified or replaced.

Later legislation, AB 1923 of the California State Legislature, 1970, revised the charge to the Committee and required that the Advisory Committee on Program and Cost Effectiveness develop and recommend a methodology for evaluating cost effectiveness and that the State Board of Education should use such methodology in determining which projects should be expanded, modified or replaced.

The advisory nature of the Committee was well stated by the Chairman, Mr. Alvin L. Rosenthal, in a memorandum to the Committee members which stated in part:

". . . This memorandum is to offer for your consideration my thoughts and the thoughts of others who have set forth in print a concept and function of an Advisory Committee.

Considering the word advisory, there is a distinct implication

that the individual or individuals so charged will consider and weigh a given amount of data or set of circumstances or both and from this draw conclusions in the form of opinions or advice. It follows naturally that these opinions or this advice will be relayed to a pre-designated individual or group who will in turn weigh the quality of the advice as well as the knowledge, reputation and integrity of the advisors. The individual or group having thus been advised needs only to act upon that advice.

Advisory Committees are set up to respond to a great variety of technical and scientific problems. The members of the group are invariably selected because they possess specialized knowledge, which when brought to bear on the problem should bring forth the quality of advice that is being sought.

It would appear to me that the members of most Advisory Committees already possess the knowledge required to render the advice being sought. In the situation where the task is in the nature of a research project, however, the members of the Committee might in all likelihood spend considerable time learning the present "State of the Art." They might also spend some time in maintaining the requisite knowledge to render competent advice. It would appear to me, however, that beyond learning the "State of the Art" and maintaining the requisite knowledge, the members of an Advisory Committee need only to mobilize the forces required to undertake and accomplish the research or development task.

Consider this: If an Advisory Committee were formed to bring into existence a very specialized type of building for the Government or for a Corporation, its members would no doubt represent a variety of professional disciplines. The group would no doubt meet and elect a chairman and set about to discuss the needs of this building and when it should be completed. After establishing a broad-building concept, the Committee would undoubtedly select an Administrator who would oversee the entire project. This Administrator would then definitize the Committee's building concepts to a degree that the building needs could be interpreted by an architect. At the proper point in time, an architect would be selected and the plans would be prepared. The Administrator would at the proper time consult various prime contractors or possibly recommend to the Committee that the job be accomplished by engaging subcontractors. If the subcontractor route was adopted, the Administrator and the Committee would then proceed with the building plans, considering each aspect of the task as it came to fore. Where structural, electrical, air-conditioning, decorating and dozens of other specialized matters were involved, certain members of the Committee might assume a more dominate advisory role. At no point in the entire project would any member of the Advisory Committee lay a brick, weld a girder, or paint a wall, or even give a direct order to a foreman or supervisor on the job. Advisory Committees are not formed for that purpose; their purpose is to give advice, counsel and direction to their administrative officer and to their sponsoring authority in order

that the specified task can be accomplished to the optimum benefit of the sponsor."

ORGANIZATION OF THE COMMITTEE

The first few meetings were devoted to an orientation of the job to be accomplished and to the specific programs listed in the legislation which were administered by the Department of Education.

At the first meeting an outside consultant, at the request of the Department of Education, presented an analysis of the work to be done together with a work plan and organizational charts showing the relationship of the various units within the Department of Education and the Committee. At a later meeting another plan was proposed by a member of the Committee which was subsequently adopted by the Committee and became the basic guide for the rest of the life of the group.

An election of officers was held at the second meeting and subsequently, as the work plan was adopted, sub-committees were appointed to complete specific tasks.

The Committee met monthly with additional special meetings called when needed and with sub-committees meeting between the regular sessions. For the first year the executive committee met on the evening before the regular meeting to assist in planning and taking care of minor matters. With the start of the second year the executive committee was abolished and the total group, feeling the need for more time, met regularly with an evening meeting followed by an all day meeting the next day.

During the first year there was a problem of communication between the Committee and the Department of Education caused by the complexity of the problem with different perceptions of the desired outcomes, a change in administration leadership and lack of agreement as to some procedural matters. These were pretty well solved by the start of the second year and work proceeded more rapidly. It was felt that a clearer initial definition of roles and responsibilities at the beginning could have made for a smoother operation during the first year.

Dr. Lewis Kohler, with the assistance of Mr. Donald Kitch and Dr. William McCormick, developed a set of guidelines called "Guide to Policies and Procedures of the Advisory Committee on Program and Cost Effectiveness." This document contained general policy guidelines for the Committee as well as specific rules and regulations covering the operation of advisory committees, the position of the executive secretary and organizational charts showing the relationship between the Committee and the State Department of Education and the California State Legislature. A copy of this document is in the permanent files of the Committee.

Officers and sub-committees that were formed are listed as follows:

ADVISORY COMMITTEE ON PROGRAM AND COST EFFECTIVENESS

OFFICERS ELECTED

March 1970 - April 1971

Mr. Alvin L. Rosenthal, Chairman

Mr. Allen S. Ginsburgh, First Vice Chairman

Dr. Agnes S. Robinson, Second Vice Chairman

EXECUTIVE COMMITTEE*

March 1970 - April 1971

Mr. Alvin L. Rosenthal

Mr. Allen S. Ginsburgh

Dr. Agnes S. Robinson

OFFICERS ELECTED

April 1971 - March 1972

Mr. Alvin L. Rosenthal, Chairman

Dr. John A. Geddes, Vice Chairman

*Discontinued after April 1971

ADVISORY COMMITTEE ON PROGRAM AND COST EFFECTIVENESS

SUB-COMMITTEES FORMED

Chairman Alvin L. Rosenthal - Ex officio member of each sub-committee

Objectives : Dr. Agnes S. Robinson, Chairman
Dr. John A. Geddes
Mr. Morris E. Currey
Dr. Lewis T. Kohler

Measurement: Dr. John A. Geddes, Chairman
Mr. Donald E. Kitch
Dr. Lewis T. Kohler
Dr. Agnes S. Robinson

Scaling : Mr. Donald E. Kitch, Chairman
Dr. John A. Geddes
Dr. Agnes S. Robinson

Costs : Mr. Clarence R. Newby, Chairman
Mr. Allen S. Ginsburgh
Dr. Lewis T. Kohler

Planning : Dr. Lewis T. Kohler, Chairman
Mr. Donald E. Kitch
Mr. Clarence R. Newby
Mr. Allen S. Ginsburgh

WORK PLAN

An initial work plan developed by Dr. C. W. Stone at the request of the Department of Education was presented at the first meeting of the Committee in March 1970. (A complete copy of this report is in the Committee files.) At the meeting in May 1970, Mr. Allen Ginsburgh presented another work plan and associated time line which were subsequently adopted by the Committee. The work plan as presented to the Committee is reproduced here in full.

11 May 1970

To: Members of the Advisory Committee on Program and Cost Effectiveness, California State Board of Education

From: Mr. A. S. Ginsburgh, Committee Vice Chairman

Subject: Tentative Committee Program Plan

I. INTRODUCTION

A program plan is presented herein for the committee to consider in the accomplishment of the task assigned to it by the California State Assembly Bill No. 606, Chapter 6.8, "Educational Improvement Act of 1969."

The above noted act states as follows:

"6499.201 -- It is the intent of the Legislature that the funds provided by this Chapter and the funds provided through Title I and Title III of the Elementary and Secondary Education Act of 1965, the Miller-Unruh Basic Reading Act of 1965 . . . and Chapter 106 of the Statutes of 1966, first extraordinary session, be expended in the most effective way possible, and that cost effectiveness measures be employed in the approval and evaluation of all projects. It is the further intent of the Legislature that all projects be evaluated annually as to the degree of program achievement and the cost effectiveness produced; that highly effective projects shall be expended to further use in the district where operated and in other districts; and that less effective projects be replaced with ones of proven effectiveness, or by new projects which hold promise of high effectiveness.

It is the intent of the Legislature that the effectiveness of a project be measured in terms of the objectives of the project, and that each district should be primarily concerned with the pupils' improvement in ability to read, to use and understand the English language and to use and understand the concepts of mathematics.

The Legislature intends that each project be evaluated annually by the Department of Education to determine and identify its relative effectiveness; that each evaluation shall be assisted by an Advisory Committee competent to assess the effectiveness of the results of the project and to make recommendations to the Department of Education and to the State Board of Education on projects to be expanded in use and those that should be modified or replaced to produce greater effectiveness.

"6499.204 -- The Advisory Committee on Program and Cost Effectiveness shall (1) advise the Department of Education and the State Board of Education on projects to be approved, and the administration of Titles I and III of the Elementary and Secondary Education Act of 1965, the Miller-Unruh Basic Reading Act of 1965 (Chapter 5.8) commencing with Section 5770 of Division 6 and Chapter 106 of the Statutes of 1966, first extraordinary session, (2) assist in the evaluation of the program achievement of projects, (3) assist in the determination of the relative cost effectiveness of projects and (4) advise on the projects which should have expanded use and those which should be modified or replaced to produce a higher degree of program achievement and cost effectiveness."

The supportive subtasks considered necessary to the accomplishment of the above charge are described and scheduled herein. A sub-committee structure is recommended and supporting staff is defined. The program is scheduled so as to provide firm recommendations to the Department of Education in August of 1971 and to have these implemented and functioning in February 1972. The program schedule is shown in Figure 1.

The Committee has already recognized the need for its own education prior to formulating the details of its approach and conducting its investigations and evaluations. This education should be in four areas:

1. To thoroughly understand the task intended by the State Legislature.

2. To understand the legislative programs in compensatory education for which program and cost effectiveness measurement methods will be evolved.

3. To understand how educational funds are budgeted and managed at each level of administration and thoroughly understand the sources of these funds.

4. To thoroughly understand the current state-of-the-art of educational program formulation, methods of accomplishment, and administration, as well as methods of measurement and evaluation.

Following this educational phase, the committee must be prepared to establish objectives in usable forms, choose methods of achieving these objectives, establish scales for the measurement of accomplishment toward the objectives along with techniques for introducing unquantitative factors. These several elements must then be combined into a recommended model or method suitable for quantifying, measuring and evaluating program and cost effectiveness. The committee should then verify the usefulness of its model and establish a method for implementing the utilization of its model.

II. OBJECTIVES IN COST EFFECTIVENESS

Cost effectivity is a concept devised in the early days of Mr. McNamara's tenure as Secretary of Defense. It recognized that there were more reasonable demands on the dollars then available to the Department of Defense than could be met and sought to establish criteria for projecting the greatest return for the money spent. In this instance, the criteria utilized involved the objective of the weapons systems and concerned such statistically established elements of criteria as functional capability and kill probability. One of the most effective criteria that can be imagined in this regard would be to consider the dollar cost to our Defense Agency to achieve effective equivalent dollar loss to our adversaries. Another example of cost effectivity is the use of cost per pound of payload in orbit which is used as a guide for space booster considerations. A more common measure of cost effectiveness is the cents per passenger mile or per ton mile used in comparing transportation means. Note that in each case, an objective is established in measurable terms such as "dollar damage to an enemy," "moving people," etc. It is apparent that if we are to think in terms of cost effectiveness in this undertaking we must clearly establish our objectives. Further, the objectives chosen should be such as to lend themselves to as much measurement in quantitative terms as is possible.

III. PROGRAM PLAN

The Program Plan (Figure 1) has been prepared for consideration of the committee which envisions study and formulation in the several areas discussed above, finally culminating in the construction of a model (or the modification and acceptance of an available model) and the implementation and utilization of this model. The plan envisions establishing sub-committees in the several areas. These would draw on the Department of Education specialists and specialists and consultants from the academic community. Each sub-committee will be charged with accumulating and synopsizing information in the area assigned for presentation to the full committee along with recommendations for action and/or acceptance. The sub-committee will also sponsor and plan presentations by consultants and other experts to the full committee as they might deem desirable.

The Program Plan is based on the assumption that only three working sub-committees can be supported at one time. Each is expected to meet separately and report to the full committee as indicated in the Plan. They will take direction from the full committee during the period of study. Thereafter, the full committee will establish the position on that subelement and proceed to the next.

The program is divided into the following phases and tasks:

Phase I - Program Review

Task A, Title I

Task B, Miller-Unruh Act

Task C, Title III

Phase 2 - Component Studies

Task A, Program Study and Adoption

Task B, Fiscal Studies

Task C, Objectives

Task D, Methods

Task E, Scaling

Task F, Intangible Equivalent

Phase 3 - Modeling

Task A, Experimental Modeling

Task B, Data Comparison

Task C, Procedural Definition

Task D, Procedural Evaluation

Phase 4 - Implementation

Task A, Implementation Studies

Task B, Formulation of Recommendations to the State Board

Task C, State Board Study and Acceptance

Task D, Implementation Supervision

Task E, Development of Management by Exception Techniques

Phase 5 - Operational

Task A, Program of Annual Review

IV. PHASE I - PROGRAM REVIEW

This initial phase of the program has been planned to provide the committee with complete familiarity with the Legislative acts and programs which are the focus of the evaluation methods the committee is charged with developing and conducting. In this phase the committee will primarily depend upon briefing from the State Department of Education. The areas of interest to the committee, as stated earlier by the committee, are repeated below.

A. Definition of Program objectives.

B. Program Operational Procedures.

C. Methods of determining student population.

D. Methods of choosing the district and school participants.

E. Evaluation and measurement methods.

F. Program content as organized in subcategories.

G. Program scope in terms of dollars and participants.

H. Program assessments.

The committee may request bibliographies providing sources to additional information and assistance in obtaining these sources.

The committee may desire and request a synopsis and status report for future reference from the proper department personnel.

The committee will request future status reports on the progress of work under these legislative acts on each subsequent January and June as regards the work in the preceding term.

The committee will also request that the State Department of Education set up field trips at least twice a year to permit the committee to visit the school and to see programs in operation. One such visit should be made during this current school term.

V. PHASE II - COMPONENT STUDIES

Task A - Program Study and Adoption

One of the first studies of the committee will be to review, modify, and adopt this Program Plan or an alternative. In its May 1970 meeting the committee will have opportunity to be briefed by the Legislative Assistant who framed the act establishing this committee.

The Program Plan and time line presented herein need not be considered to be firm even after modification and adoption; but should be subject to change as the program develops.

Task B - Fiscal Methods Study

Task B-1 of this Fiscal Methods Study is to become cognizant of the program Planning & Budgeting system recently adopted by the State for all State functions. This is again a procedure adapted from the Department of Defense. The committee has planned an additional familiarization and presentation during its May meeting by the Vice Chairman, Dr. Agnes Robinson. It is contemplated that the committee will request and receive additional presentations on this subject during the June meeting.

The second portion of this task is to learn how the various school districts handle their internal finances in order to get accurate assessment as to the actual costs of these compensatory educational programs. The committee should satisfy itself that the costs reported from the various school districts are comparable both at present and in the future when the PPBS System is fully operative.

The third portion of this task is to evaluate the adequacy of the fiscal measuring and reporting system which will be utilized for control and measurement of the programs under the committee's surveillance. If modifications or changes are desirable, the committee will formulate suitable recommendations.

Task C - Study of Objectives

As noted in the introduction, it would be highly desirable from the point of view of cost effectiveness measurement, if objectives could be expressed for compensatory educational programs which could be measured quantitatively. The introductory remarks in the Title I Annual Report state that "compensatory education is aimed at insuring that every child will receive an equal opportunity to succeed to the full extent of his potential regardless of his economic, social, or cultural background." It is not at all apparent how this statement of objective can be reduced to quantitative terms. However, it may be possible to break it down into components which better lend themselves to quantitativeness. The potential capacity to "achieve" was at one time thought to be measured by "intelligence tests." However, these are now known to be misleading because they presuppose a knowledge of language and society which might not exist. As example, in lieu of this, we might think of "potential" in terms of a demonstrated <u>rate</u> of absorption, utilization and understanding.

A sub-committee should be established to study this fundamental task of defining acceptable objectives in measurable terms. It may choose to request assistance from the State Department of Education and from the academic community.

It is difficult to perceive of an approach to the measurement of education which does not involve some kind of testing. However, the specific objectives chosen should help to crystalize the What, Where, How, and Why of the tested population and of any comparison population. However, this plan places the responsibility for investigating measurement methods in a separate subtask.

Task D - Study of Methods

The purpose of this task is to study the state-of-art of educational measurement. Initially, the field will be surveyed in general; assistance will be drawn from the State Department of Education and the academic community. The question of the accuracy of testing should be addressed and the factors which affect it. What kinds of tests have been developed? Can they be categorized? What do they show, relative to accomplishment in terms of the acquisition of knowledge, its understanding, and its utilization.

The program is planned so that the sub-committee can learn about the subject first, and then synopsize information for the full committee to assist in the other sub-committee's activities. Thus, when Task C Committee has reached a conclusion, the Task D activity will be in a position to recommend specific methods of measuring the attainment of the objective chosen shortly thereafter. Among other matters, the sub-committee should determine if the various programs (i.e., Title I, Miller-Unruh, etc.) should be measured differently.

Task E - Study of Scales

Task E has been planned for initiation just prior to the completion of Task C. Once the objective has been set, this sub-committee should consider the suitable scales by which each attainment might be measured. Apparently the State has already adopted "equivalent school years attainment per year" as a scale. This might be considered along with other approaches. In addition, the committee should establish what is "acceptable" or "unacceptable" as determined by the scale established.

The sub-committee should also consider and attempt to identify intangible factors which affect its scale and measurements.

The sub-committee on Task E will work closely with that on Task D and strongly influence the recommendations of that sub-committee. They will also interrelate with the work of the Task F sub-committee.

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Task F - Intangibles and Equivalents

This task is to consider possible quality of attainment and accomplishment which could result from these compensatory educational programs but which are not measurable in the sense sought above. This is not to address the effect of environment, language difficulties, etc., on the results of the measurement. Rather, this task should assess such factors as improvements in study habits, change in student attitude, etc. This sub-committee will determine how to define these factors and how to establish equivalent quantitative terms to factor or operate upon the other quantitative measurements in some fashion.

A further and difficult qualitative assessment to make is to introduce into Title III considerations, the probability that Title III experimental programs which have been found to be successful will actually be introduced into the curriculum after Federal and State support are no longer available.

VI. PHASE III - MODELING

Task A - Expimental Modeling

The program plan presented assumes that the committee has achieved enough background by the Fall of 1970 to undertake study of its evaluation model. The approach presented is similar to that used earlier in the plan. A sub-committee will evaluate the current state-of-art as it exists. They will utilize the State Board of Education and the academic community to obtain background information and data. They will then utilize this information and the prior accomplishments of the preceding phase. In effect, this task is an integration of what has gone before. It is envisioned that the model chosen could consist of results from one or more testing programs integrated by a pattern of mathematical operations (i.e., ratios, differences, etc.) plus a procedure for modifying the test data, the method, or the final determination which is related to the nontangible factors. It would be hoped that the results could be plotted on a definable scale which may be interpreted in degrees of program acceptability.

Task B - Comparison with Available Data

The effort envisioned in this task is to collect data from ongoing programs which can be utilized in testing the model chosen. The objective will be to examine the kind of results which the model produces. It may occur that no data is available which might be suitable. In this case, the sub-committee may initiate the generation of data. It will utilize the assistance of the sub-committee on Task D, below (and will conduct a test of both model and procedure simultaneously).

Task C - Procedures

The Task C Committee will establish a recommended procedure

for collecting the data required for the operation of the evaluation model. Typical problems which might be addressed include: Can the same forms and format be employed for all programs? Will the performing districts be held more rigidly to procedure and method? Detailed procedures should be worked out in a preselected level of uniformity and designed so as to ensure that the data required for the evaluation model is obtained and is comparable from one program to the next.

Task D - Procedural Testing

This will be the final model testing planned. It may be desirable to extend the period allowed in the plan or to utilize only partial implementation (see below) to be followed by a second evaluation period at a later date. This experimental procedural test will probably be conducted by the State Department of Education with Committee direction and assistance as will all other Committee instigated testing.

VII. PHASE IV - IMPLEMENTATION

Task A - Implementation Studies

The purpose of this study is to pinpoint those changes necessary in the administration of these laws so as to implement the Committee recommended evaluation model. This may introduce greater standardization in program management, place changed or increased responsibility upon the performing school districts, require additional data from them, etc. The Committee may wish to recommend a training session for school program administrators or a revision to portions of the current guidelines.

Task B - Formulation of Recommendations

The Committee will have completed adequate work at this point in the plan to make firm recommendations to the State Board of Education, the State Department of Education and the Legislature. These recommendations should include a full description of how the Committee suggests it will conduct program and cost effectiveness evaluations of compensatory educational programs.

Task C - State Board Study and Acceptance

The Committee will support the State Department of Education during the evaluation of the Committee's recommendations. As a result of this study, the Committee may choose to modify portions of its recommendations.

Task D - Implementation Supervision

Following acceptance of the Committee's recommendations by the State, the Committee will assist the State Department of

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Education in the implementation of the adopted procedures. They will help to interpret and act in an advisory and/or supervisory capacity as may be desired by the State.

Task E - Development of Management by Exception Techniques

It is envisioned that the size and number of programs involved will still prevent the Committee from evaluating each one individually. Therefore, the Committee should establish a plan utilizing management by exception techniques to separate those areas requiring attention from those that can be handled within the established procedure.

VIII. PHASE V - OPERATIONAL

The Committee having completed the critical planning task, will then be operational. In the course of its review, it is anticipated that the Committee will see areas where it may make further studies and recommendations. Upon successfully negotiating the work noted above, the Committee will have adequate background to define useful areas for further studies and to provide further recommendations both as to curricula and administration.

IX. STAFFING

Having programmed the activity of the Committee, it is now possible to define supporting assistance required. It is recommended that the Committee hire a staff consisting of one professional and one full-time secretary.

The professional will, at the requirest of the committee chairman and sub-committee chairmen:

a. Definitize the requests of the Committee of the State Department of Education and coordinate the responses.

b. Locate and recommend suitable consultants in specific areas of interest to the Committee.

c. Conduct literature surveys at the direction of the Committee.

d. Plan Committee field trips.

e. Summarize sub-committee activities for the use of the full Committee.

f. Prepare reports.

g. Provide additional support as required.

The professional should be experienced in educational programing, methods and administration. Most desirably he (or she) should be experienced in compensatory education and intimately familiar with appropriate Federal and State statutes.

The secretary will provide support to the professional, prepare and maintain committee records, provide arrangements, agenda, etc., as may be required and provide additional assistance and support to the committee members upon request.

REVIEW OF WORK PLAN - January 1971

In January 1971, Mr. Ginsburgh reviewed the accomplishments of the Committee up to that time and projected the tasks that needed to be completed by each of the sub-committees in the development of the methodology for assessing cost effectiveness. The tasks by sub-committee were as follows:

Sub-committee on Objectives - The Committee has limited its work to the subject areas of reading and mathematics. To be compared, programs must have the same objectives. The Sub-committee on Objectives should compile and adopt a set of detailed instructional objectives which are individually measurable and which, in total, describe what we mean by reading skills and mathematical skills. This will provide comparable, measurable, instructional objectives. The identification of all of the measurable instructional objectives of interest to the Committee is the task of this sub-committee.

Sub-committee on Measurement - The choosing or devising of a test or set of tests to measure the instructional objectives identified by the Sub-committee on Objectives is the task of the Sub-committee on Measurement.

Sub-committee on Scaling - The success of any given instructional program is strongly dependent on the characteristics of the population taught and the environment in which it is taught. The task of the Sub-committee on Scaling is to identify those population characteristics and environmental factors that seem to have an influence on learning and to divide them into measurable and nonmeasurable variables.

Sub-committee on Costs - The program costs consist of all cost elements identified with the program. The task of this sub-committee is to identify the costs that should appropriately be charged to a program and a format for collecting these costs.

REVISION OF WORK PLAN - August 1971

Following the completion of Phase I and the progress report to the State Board of Education, a Sub-committee on Planning, under the chairmanship of Dr. Lewis Kohler, met several times and produced several reports pertaining to future action. A staff review and compilation of this work produced a sequence of tasks for the completion of Phase II, III, IV and V with objectives for each phase. The tasks, objectives and time line were as follows:

In projecting the tasks required to complete Phase II, Component Study, the following should be included:

1. Recommendations for terminal objectives for
   a. Demonstration project, grade 7
   b. Grade levels 1-12
2. Recommendations for measuring instruments for
   a. Demonstration project, grade 7
   b. Grade levels 1-12
3. Recommendations for student characteristics and other variables to be included in the
   a. Demonstration project
   b. Cost Effectiveness Model
4. Recommendations for all resource inputs to be included in the
   a. Demonstration project
   b. Cost Effectiveness Model
5. Recommendations for the format in which each of these types of data should be collected and reported.

Phase III, the construction of the Model, would follow Phase II and would be primarily the assembling, testing and modifying of the outputs of Phase II.

Phase IV, the implementation of the Model, would require the application of the Model to selected projects of the several funding sources named in AB 606 with a determination of any changes required in the initial application and in the final reporting of these

projects.

Phase V, where the Model would be put in general use with the appropriate categorical programs, would be the responsibility of the State Board of Education.

Objectives for Phase II

1.0 By October 1, 1971, the Sub-committee on Objectives will have worked with personnel from the Riverside Unified School District in their formulation of specific behavioral objectives for the students participating in the demonstration program in reading and math at grade 7.

2.0 By May 31, 1972, the Sub-committee on Objectives, with the assistance of the Department of Education and other agencies or consultants as required, will have formulated specific behavioral objectives in the content areas of reading and mathematics for student achievement levels at the end of each grade 1-12 in schools throughout the state.

3.0 By October 1, 1971, the Sub-committee on Measurement will have worked with personnel from the Riverside Unified School District in their determination of the measuring instruments to be used in assessing the degree of success in attaining the objectives formulated for the demonstration program in reading and math at grade 7 and the format in which the data will be collected.

4.0 By May 31, 1972, the Sub-committee on Measurement, with the assistance of the Department of Education and other agencies or consultants as required, will have determined the measuring instruments to be used in assessing the degree of success in attaining the objective formulated for students in each grade 1-12 in schools throughout the state and the format in which the data will be collected.

5.0 By October 1, 1971, the Sub-committee on Scaling will have worked with personnel from Riverside Unified School District in their identification of the student characteristics and other variables that may be considered in the demonstration program in reading and math in grade 7 and the format in which the data will be collected.

6.0 By May 31, 1972, the Sub-committee on Scaling, with the assistance of the State Department of Education and other agencies or consultants as required, will make recommendations as to the student characteristics and other variables that may be included in the Model based on experience gained with the Riverside Unified School District and other sources as appropriate.

7.0 By October 1, 1971, the Sub-committee on Cost and Finance will have worked with personnel from the Riverside Unified School District in their identification of the resource inputs that will be documented in the demonstration program in reading and mathematics in grade 7 and the format in which the data will be documented.

8.0 By May 31, 1972, the Sub-committee on Cost and Finance, with the assistance of the State Department of Education and other agencies or consultants as required, will make recommendations as to the resource inputs that will be included in the Model based on experience gained with the Riverside Unified School District and other sources as appropriate.

Objective for Phase III

1.0 By October 1, 1972, the Advisory Committee on Program and Cost Effectiveness will have completed a Model by which cost effectiveness can be measured in the areas of reading and mathematics.

Objective for Phase IV

1.0 By March 1, 1973, the Advisory Committee on Program and Cost Effectiveness will have applied the Model to selected projects in Title I ESEA, Title III ESEA, Miller-Unruh Basic Reading Act of 1965 and Chapter 106 of the Statutes of 1966, and will make recommendations for any changes that may be required in the initial application forms or the final reporting forms for projects under each of the above listed funding sources.

Objective for Phase V

1.0 By April 1, 1973, the Advisory Committee on Program and Cost Effectiveness will recommend to the State Board of Education a Model which may be used to assess the cost effectiveness of programs in reading and mathematics.

Riverside Project

Model

Activities	1971 Sept.	Oct.	Nov.	Dec.	Jan.	1972 Feb.	March	April	May	June	July	Aug.
Establish and maintain liaison with Riverside staff											(7/1/71-6/30/72)	
Sub-committees review project for their special interests		(7/1/71-9/30/71)										
Initial selection made for items to be included in proj.		(7/1/71-9/30/71)										
Initial selections reviewed by staff		(7/1/71-9/30/71)										
Final selection made for inclusion in project		(7/1/71-9/30/71)										
Sub-committee reports to total committee			(10/18/71)									
Establish criteria for inclusion in Model			(-- -11/12/71)									
Estimate personnel requirements to complete task			(-- -11/12/71)									
Make arrangements to secure personnel			(-- -11/12/71)									
Maintain liaison with other sub-committees as required											(-- -6/30/71)	
Identify existing elements						(9/13/71-1/21/72)						
Select appropriate elements										(9/13/71-5/31/72)		
Make recommendations to total committee											(6/1/71-6/30/72)	

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REPORTS OF THE SUB-COMMITTEES

As sub-committees made progress towards their goals, reports were submitted to the full Committee for consideration. The reports that follow have been edited somewhat to minimize redundancy, but the complete reports are in the permanent files of the Committee.

SUB-COMMITTEE ON OBJECTIVES

Report to full Committee, September 11, 1970.

Based on the discussion of those present at the sub-committee meeting on September 10 and 11, a few introductory remarks may help to clarify the material developed which is presented in the following pages:

Considerable confusion and controversy arose over the target group related to the sub-committee's basic task, the development of objectives. Were these to be measurable objectives for the AB 606 Committee; or, for the several populations, pupils, teachers and parents, to be enhanced through Title I and Title III of ESEA and the Miller-Unruh Reading Programs? Reference to the program plan adopted by the Committee at its July meeting served to clarify the issue. The following statement is made on page 9 of this document: " . . . it would be highly desirable from the point of view of cost effectiveness measurement, if objectives could be expressed for compensatory educational programs which could be measured quantitatively." The sub-committee's assignment, therefore, was to provide a base, at least, for a hierarchy of goals and objectives for the recipients of the three compensatory programs.

Prudence dictated that the sub-committee begin with those constraints on outputs or products which had been mandated or defined through Federal and State enactments, rules and regulations of the California State Board of Education, and procedural and approval requirements developed by the various offices concerned with these programs in the California State Department of Education. In addition, perusal of the source documents enabled the sub-committee to analyze the scope of the written intent of the three programs. In the sections which follow the specific sources of key statements are enclosed in parentheses.

In order to distinguish between goals of the Committee and goals of program recipients, statements pertinent to each were prepared; two related to the overarching mandate given to the AB 606 Committee by the Legislature and three for the target populations identified in the published materials related to the separate programs. Where explanatory information seemed necessary, as in the definition of a specific population, it was added and the

source cited.

The framework which follows is still incomplete. It requires detailed translation into (1) program objectives stated in terms of the population to be benefited, and (2) further delineation of each program objective into performance objectives which can be measured through a system of qualitative and quantitative evaluation. For example, the six program objectives of Title I were drawn directly from the McAteer Act - SB 482. Objective 1.1.1 would be improved by stating it as follows:

1.1.1 Pupils will read at or above the grade equivalent appropriate for their chronological age as measured on criterion referenced tests and on a standardized test of reading achievement.

More specific performance objectives for pupils derived from this program objective follow:

1.1.1.1 Demonstrate increasing mastery of the reading vocabulary through word memory, word recognition skills and context clues.

1.1.1.2 Read with comprehension and apply what is read in a meaningful and productive manner.

1.1.1.3 Read for appreciation, enjoyment and to obtain information.

1.1.1.4 Interpret printed material effectively, make inferences and draw reasonable conclusions.

1.1.1.5 Demonstrate the use of reference skills.

This appears to be an appropriate task for the Committee's professional consultant in cooperation with representatives of the California State Department of Education.

Dr. Agnes S. Robinson, Chairman
Mr. Morris E. Currey
Dr. John A. Geddes
Dr. Lewis T. Kohler

SUB-COMMITTEE ON MEASUREMENT

The minutes of the sub-committe meeting of November 20, 1970 cover the primary concerns in the area of measurement.

Assistant Chancellor Elwin V. Svenson and Professor Garth Sorenson, both of UCLA, testified before the sub-committee and their comments are summarized in the minutes as follows:

Chancellor Svenson began his presentation by stating that he felt the Advisory Committee on Program and Cost Effectiveness was very important to the whole state of affairs in education in the country, particularly in California. He told the Committee that they ought to be aware of the validity of tests, the variety of tests and how they are being used. The main concern in education today is elementary education and the focus of interest ought to be at that level.

Utilization of tests are for (1) diagnostic purposes, and (2) for evaluating the end results. The first use of tests has to be related to the individual for the purpose of individualizing instruction. In other words, the diagnosis must be related to the things that can be taught (to skill areas), and should describe the program the student is in. The second use is to check the progress of the student with his program of study, i.e., to evaluate the effectiveness of the program.

Next comes the task of reporting the results to the general public, school boards, teachers and the children. Chancellor Svenson felt that most people do not understand the tests enough to understand what they actually report. He told the Committee that they ought to find out how tests are used before a report could be submitted to the Legislature.

The main concern should be with the system of testing and management which can be expected to be utilized at the classroom level. Then the test can be interpreted to people by means of standards and norms, to tell them what has been going on. Definitions of programs must be understood by the school personnel, general public, parents and children before you can talk about cost effectiveness.

Because personnel costs dominate instructional budgets, utilization of the teacher's time should be a concern of the Committee. They should look at schools and see how teachers are using their time and make comparisons with other schools. The question is, if some schools are spending more time, are they getting more results? An individualized approach presents a better understanding of what is going on. A study, focused on specific sub-populations should be made of schools using the diagostic-prescriptive technique as compared with traditional schools.

Dr. Garth Sorenson (UCLA) spoke on updating concepts in testing. One of the biggest changes he noted was the way in which tests are being used. In the past, tests were for measuring children, but now they are also used to evaluate instructional programs. Schools can be compared to other enterprises because they have processes and products (product is children's learning). The problem with this is results cannot be observed directly, but you can observe consequences -- change in performance, i.e., product is defined as change in pupil performance.

The major purpose of the educational process may be to change student performance on an intellectual test. We will want to know what the student can do at the beginning of a course. Using the diagnostic approach, some things the teacher should know at the beginning of a course are the student's skills, habits, attitudes and a work sample (measuring accumulated achievement). The second step is to give the student some assignments designed to move him from where he is to where we want him to go. The third step is to test to see if they are working, i.e., to see if the teaching procedures are making a difference in the student. Interesting tests may be developed which compare an individual's present performance with his past rather than with others.

A question was raised at this point as to whether or not this implied that it would be desirable to develop tests that are not now available.

Dr. Sorenson replied that rather than tests, the problem is to define kinds of instruction, i.e., to decide what kind of instructional procedures are needed. Most teachers don't do this, but if they did, it would tell us more what we are doing. He went on to state: (1) We need to develop tests that are interesting to children; (2) Make sure they're not too easy or too hard; (3) Instead of comparing performance to another student, compare it to each individual's past performance. In other words, the instructional process should be redesigned instead of the testing process.

Dr. Sorenson spoke further about reinforcement in testing. First of all, the student should take the test; then the teacher should get feedback from this test. Special assignments should then be suggested and the student should be allowed to take the test again whenever he feels ready.

The notion of standardization is important but it should be based on criterion referenced tests. You have to know what you are measuring and what the results indicate. Standardization means the ways of giving a test and scoring it. In other words, it means two people scoring a test and coming up with the same score. Tests are used to appraise students and to show what learning has occurred.

In summary, Professor Sorenson stated that the test data should be used not to evaluate the children or the teacher, but to evaluate the method of instruction.

A question was raised by Dr. Geddes as to whether or not these tests could be used to provide the Legislature with some accountability of what is going on in the classroom. Professor Sorenson replied that this was possible because a test is a work sample of skills. Goals should be set up and students given a certain type of test to see where they are at the beginning of the year. At the end of the year the test should be repeated to see what changes have occurred.

A question was raised concerning the possibility of uniformity for a testing program for this Committee. Professor Sorenson replied that he didn't feel that a uniform test program is possible; but, policies regarding nature of testing programs can be uniform and the way in which tests are used and reported can be consistent.

A question was raised as to whether or not the Committee should compare different programs to compare outputs and cost; i.e., in comparing program A and B, what if the populations have different social and economic composition? How can judgment be made as to value of each program?

Professor Sorenson replied that in theory you could try A and B in several kinds of schools, but in practice, it is difficult because of value structures and political implications.

The question was asked, "Do you think standardized tests, as presently used, are sensitive to teaching strategy (process measures)?" Professor Sorenson's reply was negative because the tests were not built for measuring what teachers are trying to do in the classroom.

Components that he felt must be considered in a cost effectiveness model are: (1) attitude of principal; (2) attitude of staff and facility regarding teaching; (3) whether or not the school allows time so teachers can utilize information to modify curriculum; (4) parental involvement, and (5) flexibility between school and central district.

You can come up with criteria by comparing: (1) principals - their attitudes in relationship to students, teachers and community; (2) attitude of faculty - their belief in the diagnostic approach, and (3) parents - their understanding of what is going on in the school.

Professor Sorenson feels that we need repeatable programs; further, what repeatable programs we have should be investigated as to their costs and the number of personnel required to administer programs.

When questioned regarding the use of indirect measures of effectiveness, Professor Sorenson told the Committee that they should not evaluate a whole program because it is too complex, but rather, they should evaluate a program, a piece at a time.

Professor Sorenson was asked to restate his interpretation of formative evaluation. He stated that the purpose of formative evaluation was to find out if a program is working or not; and secondly, the task of getting information that you need to improve the program. The second step was emphasized as being more important than the first.

Dr. John A. Geddes, Chairman
Mr. Allen S. Ginsburgh
Dr. Lewis T. Kohler
Mr. Clarence R. Newby
Mr. Alvin L. Rosenthal

SUB-COMMITTEE ON SCALING

Report to full Committee, January 17, 1971.

As a discussion starter, Dr. McCormick summarized the groupings of schools used in connection with the Title I, ESEA third grade study pointing out the various characteristics upon which the groupings are based (ethnic characteristics, degree of poverty and size of school).

Several papers provided by Dr. McCormick were used.

(1) 2 SES predictors of achievement are family income and race[1]

(2) Other things to be considered in "scaling"

(a) Reviewed Levin's paper which contained the following variables along with regression weights[2]

Negro student's verbal score
Reading material in home
Siblings (positive equals few)
Parents' education
Science-lab facilities
Teacher salary (in thousands of dollars)
Teacher verbal score

(b) Kiesling's paper used the following variables[3]

Index of occupation
Teacher-pupil ratio
Per pupil expenditure on books and supplies
Teacher salary top decile
Value of school property per pupil
Per pupil expenditure on principals and supervisors

1. Burke, Kelley and Garns, Educational Programs for the Culturally Deprived - Need and Cost Differentials, National Educational Finance Project, Special Study No. 3, State University of New York (Albany) 1970

2. Henry M. Levin, Cost Effectiveness Analysis and Educational Policy - Profusion, Confusion, Promise, Dec. 1968, Stanford Center for Research and Development in teaching.

3. Herbert J. Kiesling, The Relationship of School Inputs to Public School Performance in N.Y. State, October 1969 (Consultant to RAND Corp.)

Using the preceding variables, he did a separate analysis for each of the following socio-economic groups:

1. Professional persons
2. Proprietors, managers, officials
3. Clerks and kindred workers
4. and 5. Skilled and semi-skilled workers
6. Unskilled workers and servants

(3) The Committee considered the demand for operational approaches to cost effectiveness analysis[4]

Three major stages:

1. Identifying alternative programs

2. Estimating the cost of each

3. Estimating the effectiveness of each

A fourth stage, which may be the most important, frequently results:

4. Designing a new program that is better than any previously considered.

Discussion by the sub-committee resulted in agreement that the immediate task would be to identify "pupil variables affecting pupil achievement that are readily measurable and for which it is possible for school districts to provide data." The following ten variables were identified and stated in tentative form:

1. Family income.

2. Ability to communicate orally in English. (It appeared that the problem involved is really a handicap in using English in the school situation. Such a handicap might appear among pupils of any ethnic background. It seemed that use of the actual language handicap as a factor rather than the ethnic background is most realistic.)

3. Academic ability or "intelligence."

4. Sex.

5. Educational level of parents.

6. Sensory handicaps.

7. Migrancy or mobility.

8. Achievement level.

9. Family size.

10. Both parents in the home.

4. Carpenter, Haggart, Levien, Rapp, Root and Sumner, Cost Effectiveness Analysis, Staff paper of the RAND Corporation.

As an exercise in determining the possibility of assigning different values to these factors, the attempt was made to place them in three value categories. With rather general agreement in most cases, the values assigned were:

Group 1- 1, 2, 3 and 5; Group 2 - 6, 7 and 8; Group 3 - 4, 9 and 10.

It was recognized that perhaps other variables should be added to this list and that it is necessary to determine what research results are available that would help with the development of such a listing. Dr. McCormick was asked to provide the sub-committee with information as to available data of this type at the next meeting.

The question of "program" variables, or descriptors, was varied; i.e., schools differ in the approaches used for instruction in compensatory reading programs. Whether this is a "scaling" problem was not resolved.

Mr. Donald E. Kitch, Chairman
Dr. John A. Geddes
Dr. Agnes S. Robinson

OTHER CONSIDERATIONS IN SCALING

As the Sub-committee on Scaling investigated the area of student characteristics that related to the student's ability to profit from instruction, it became evident that there were other factors that also influenced the student's learning rate that needed to be considered. There was also a lack of agreement as to what should be included when describing a program for replication, or what program elements needed to be the same in order to say you have the same program in two or more schools. Items that were discussed were scope and sequence of content, teaching strategies, supplies and equipment, staffing patterns, staff characteristics, funding, class size, physical facilities, administrative and support services and many others.

Contributions to the thinking in this area were heard by the Committee and a summary of some of them is presented here.

Mr. Edward Gustafson, Chief of the Bureau of Program Planning and Development and Administrator of Title III discussed his graph on instructional elements. Elements of this graph are: Instructional setting, size of group, library resource area, multi-media center, laboratory and community activities. Variables are: (1) learning style, (2) background, (3) entering capability, (4) motivation, and (5) physical ability. Reading content was classified as (1) decoding (work skills, etc.), (2) meaning, (3) comprehension, (4) appreciation, and (5) skill use.

To gain information regarding effectiveness from any instructional program, we need:

I. A set of rules for selecting the tests. Criterion referenced tests measure the intellectual skills the teacher is trying to teach; they will be used in:

   A. Measuring what the student knows at the beginning of the course.

   B. To check the effectiveness of individual lessons.

   C. To check what student knows at the end of the course.

II. A set of repeatable instructional procedures designed to improve the student's performance on criterion referenced tests. These will have to provide for differences among pupils in learning speed and motivation. Will need some remedial routines.

III. A set of formative evaluation procedures for testing and improving the constructional tools. Will include:

A. A record of each student's progress.

B. Monitoring procedures to see that the teacher used instructional program correctly.

C. Comparison groups.

Part III must be built in at the beginning of the program.

Dr. Rider discussed program variables that should be considered in a cost effectiveness model.

Some of the most important program variables he covered were:

1. Criteria for selection of students.
2. Diagnostic systems.
3. Organizational system.
4. Frequency and grouping for instruction.
5. Hours of instruction (pro rate time of instructional personnel and get instructional cost schedule).
6. Instructional techniques (80% of cost is personnel).
7. Behavior modification techniques.
8. Hardware, software systems.
9. Communication network.
10. Instructional personnel characteristics - quality factor.
11. Staff developing (inservice training).
12. Management systems (planning, monitoring the system, lines of decision making - authority).
13. Program costs must include the district costs and supplemental costs.

A paper prepared by Ruth Overfield analyzed factors associated with varying degrees of program success. As input or predictor variables, she would include:

1. Number of specialist reading teachers.
2. Library facilities and personnel.
3. Transiency of students (staff?).

4. Number of students who come from non-English speaking families or where other than English is the primary language at home.

5. Class size.

6. Teacher salaries.

7. Duration of instruction.

8. Tax rate - assessed evaluation per ADA.

SUB-COMMITTEE ON COSTS

The work of the Sub-committee on Costs, prior to the Riverside project, was oriented towards describing the existing situation and identifying practices that would need to be changed in order to gather the kinds of data required in a cost effectiveness assessment. At the meeting on May 17, 1971, Mr. Newby, Dr. Lindman and Mr. Rosenthal presented some of their views.

Mr. Newby commented on school accounting procedures which has been summarized as follows:

Present accounting systems in school districts are the result of recommendations and items involved in the Education Code. The State suggests what is to be done as an audit procedure. The entire problem is state controlled, or state oriented. All expenditures are line classified - administration, instruction, health services, operation of plant, maintenance of plant, fixed charges, pupil transportation, food services, community services, capital outlay, etc.

Generally, a clerical person is charged with the matter of accounting for the cost of a particular project. This is done not by a formal set of books, but by a series of files where purchase orders and invoices are accumulated, and if fortunate, you will have a work-sheet set out which tends to characterize expenditures and compare it with the budget. We are yet to find this file complete. The responsibility is in the hands of a clerk or person who does this in their spare time. A more effective and accurate set of records should be made. No attempt is made to supply costs in detail. A certain amount is allocated to equipment, supplies, salaries and every effort is made on the part of the school district to expend these funds. At no time can we find out if there is an evaluation going on, when decisions are made concerning projected materials and equipment; it really is not necessary. There is no detailed costing as I can follow it, intricate costs - classroom costs and some of the minute costs that we would be interested in is not being done, and indeed apparently not being required. No detailed cost analysis and effectiveness is available. In the area of accounting the State is going to have to take the leadership role. It has taken the role in the past to bring the accounting systems to where they are now, but public accounting really hasn't had a hand in suggesting or making any recommendations in this overall cost accounting. Now is the time to offer certain suggestions from the accounting profession.

Concerning the PPBS approach, will this approach solve some of the problems? If the new system at this point could entertain some of the problems that inherently are in this cost approach, if this new system can zero in on some of these problem areas, it may well be that this system can pick up the bits and pieces that this

Committee needs and bring along the real thing in the accounting system we need for our cost effectiveness.

Dr. Lindman's presentation as summarized:

What are the problems? We must consider what cost information is needed in relation to them. There are three types of analyses: (1) Incremental service analyses; (2) Alternate route; (3) Alternate goals.

Cost is much simpler than the benefit part. Teacher salary is fixed by the school board or State. The salary schedule is completely beyond the control of the director who is responsible for cost effectiveness of education. In the cost analysis of teaching a course, the biggest item is teacher's salary.

Class size is another factor which determines per student cost. It is wiser to base costs on optimum class size rather than on actual current class size. The two major factors to influence the cost of a particular program is teacher position and salary and class size.

We can make benefit cost analyses in education provided we don't put a dollar value on the benefits. If you try to convert the benefits to dollars, you will have greater difficulty and lack of progress. You must describe and evaluate the service and the amount of service rendered. Benefit costs from the economists' point of view tend to assume its dollar value on the benefit.

New program structure under development of PPBS will go a long way in identifying program costs, which are not identifiable under the old system; getting an accounting system more program oriented. This new system should go a long way in aswering your questions in the years ahead. Purpose of cost analyses: First, be sure you know what you want it for.

We are charged with dealing or finding out some information about costs in specific programs. As individuals at the State and Federal level, we have ideas about this program - that it's going to great and wonderous things and indeed the program was planned to do those sort of things. But I get a different feeling, however, from being around a school. It's a different concept entirely. At the school, in the accounting office and the business manager's office the program is just another way to get a few extra dollars in that school because they need the money so badly. Problems arise because they'll do almost anything to get another $10 - 500,000 in that school. They'll submit a program for approval to get that money that has only a vague relation to what the program was intended to do; they'll falsify a report, because getting the dollar in the budget comes first. This is the attitude I sense at most schools. Once the federal programs are adopted, cost wise the program becomes an orphan. The schools are doing largely what they've always done, except when it comes time

to report what they have done with the money. My point is that every school is different, and yet most of them are the same in this regard. They're different in that they have different people working to draw together this report, they have different costs and programs and projects, but the ultimate requirement in all of them is complete the report to see that the money is not taken back now that it is spent.

Another problem encountered in the school districts, and I'm certainly sympathetic to this, is that there is a resistance to change. There may be changes at the State level, and the administrative level, but down at the bookkeeping levels you haven't affected a change. That will be the same six months or a year from now.

Another problem that we're faced with in schools, as in industry, is a papermill. Everything we do generates another piece of paper, and the problems of paper are almost greater than the problems of cost. There is a tremendous resistance, even at the higher levels, to change when it comes to dealing with paper, and it is related directly to accounting systems and costs.

What is involved in trying to get school costs, dealing with cost systems? Budget preparation - How many teachers, name and number, classroom or principal, what school are they assigned to. This represents 80-85 percent of school costs. If it costs $40 million to run a school, at least $32 million is in salaries. The balance of the money is spent in supplies and capital outlay.

The biggest single cost is manpower, representing 80-85 percent of the budget; the other 15 percent is immaterial.

There are three cost systems: (1) Standard cost system; (2) Direct cost system; (3) Process cost system.

The final report of this sub-committee was a joint effort with Mr. Walter Parks and members of his staff from the Riverside Unified School District. This report is a system developed specifically for the Riverside project to identify and collect data on costs down to elements within a classroom. The report is included in its entirety in the Riverside project.

Mr. Clarence R. Newby, Chairman
Mr. Allen S. Ginsburgh
Dr. Lewis T. Kohler
Mr. Alvin L. Rosenthal

At the February 1971 meeting of the Advisory Committee on Program and Cost Effectiveness, the Committee made a report of their progress and findings to members of the State Department of Education. Mr. Alvin Rosenthal, Committee Chairman, introduced the Committee and described the charge to the Committee from AB 606 and AB 1923. He also described the organizational relationships and general policies and procedures of the Committee. Mr. Allen Ginsburgh summarized the Committee's technical progress in the development of the methodology and was followed by reports from Sub-committee Chairmen Dr. Agnes Robinson, Mr. Donald Kitch and Dr. John Geddes. The report on technical progress and the sub-committee reports are reproduced here in full.

THE TASK:

ASSEMBLY BILLS
Nos. 606 & 1923

DEVELOP AND RECOMMEND --

METHODOLOGY FOR COST EFFECTIVENESS EVALUATION TO

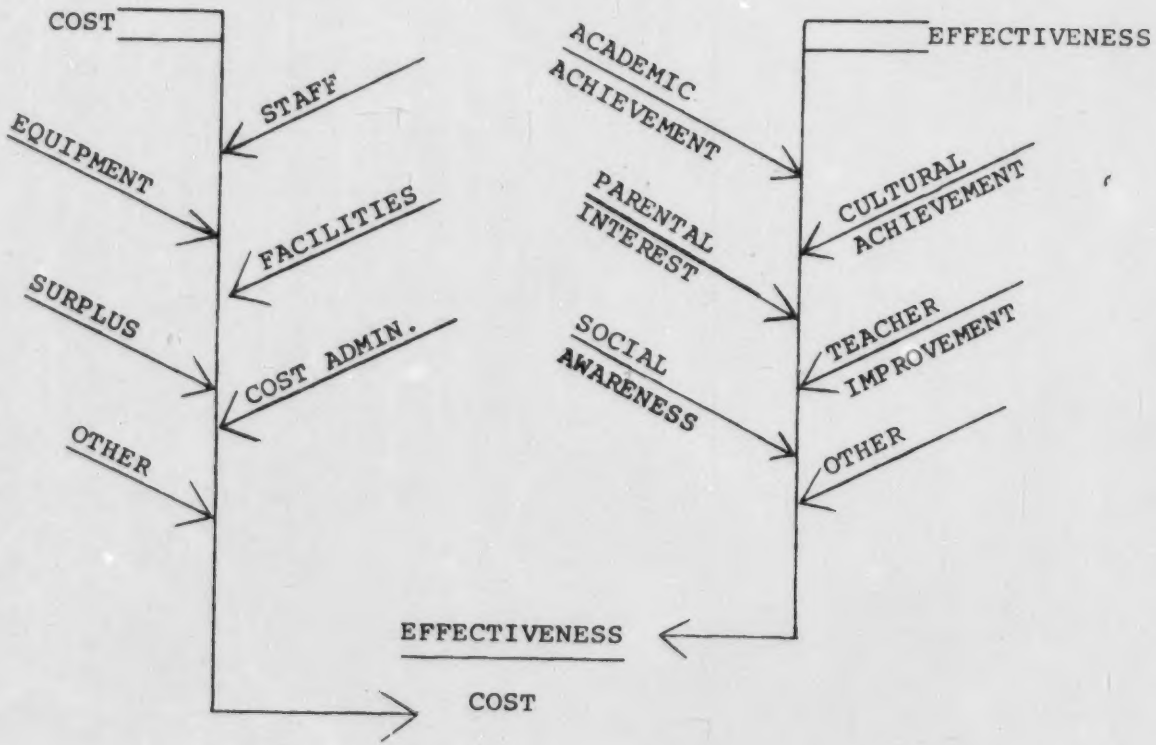
FIRST : DETERMINING WHICH PROJECT
- TO EXPAND OR REPLACE

SECOND: DETERMINE HOW TO PRODUCE A HIGHER
DEGREE OF PROGRAM COST EFFECTIVENESS

THIRD : ASSIST IN EVALUATING PROGRAM ACHIEVEMENT

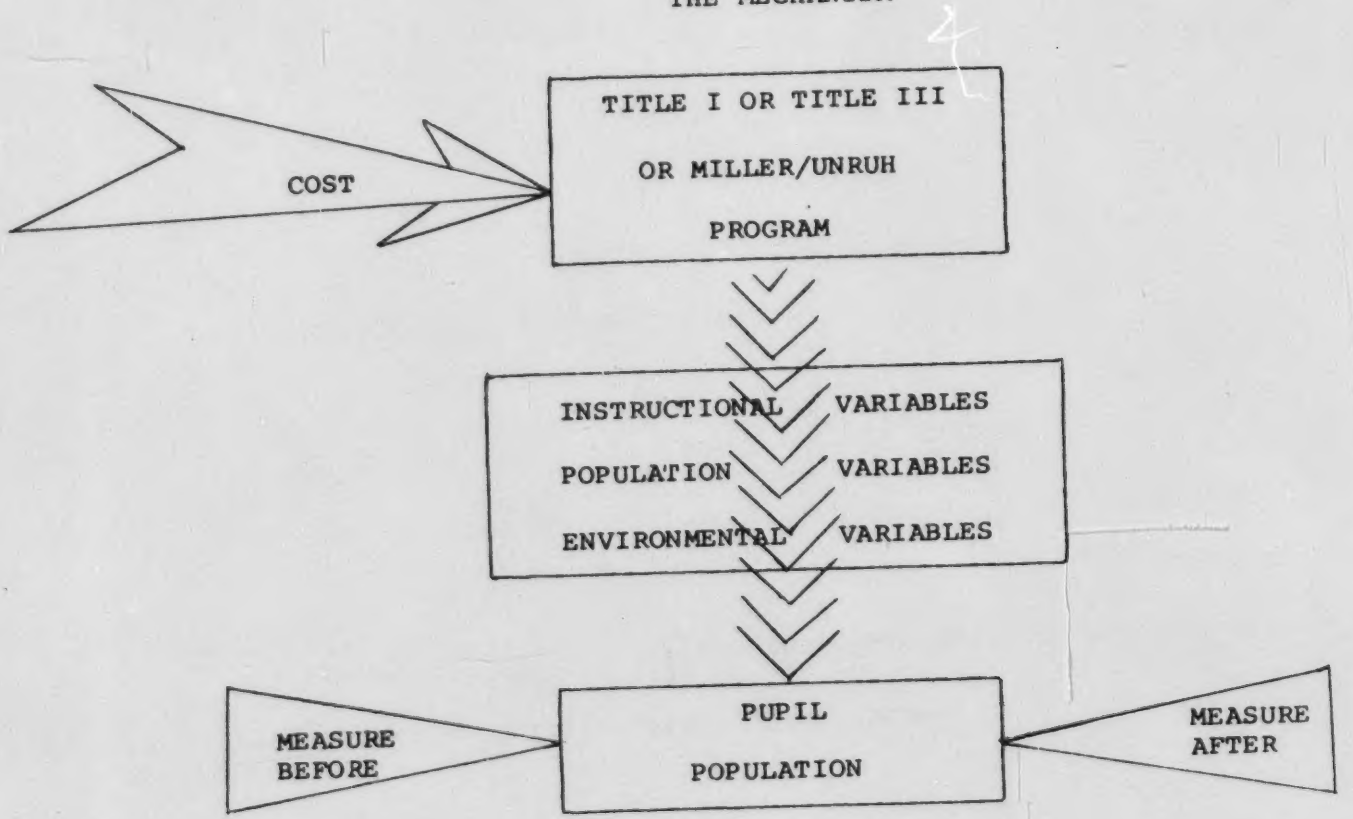
THE PROBLEM (PAGE ONE):

EACH PROGRAM GENERATES



THE PROBLEM (PAGE TWO):

THE MECHANISM



THE APPROACH:

PHASE I ---- REVIEW - OUR TASK

STUDY ENABLING LEGISLATION - TITLES I & III

MILLER/UNRUH

PHASE II ---- COMPONENT STUDIES

IDENTIFY/STUDY FACTORS

RE: COST EFFECTIVENESS

PHASE III ---- MODELING

CHOOSE/DETERMINE MODEL

DEFINE USE - TEST

PHASE IV ---- IMPLEMENT

PROCEDURES FOR USE - TEST

MAKE RECOMMENDATIONS

PHASE V ---- OPERATION

THE PLAN - PHASE I:

PROGRAM REVIEW

TASK A -- TITLE I (ESEA)

TASK B -- MILLER/UNRUH ACT

TASK C -- TITLE III (ESEA)

C O M P L E T E

WE ARE TO DETERMINE THE COST EFFECTIVENESS

OF PROGRAMS SUPPORTED UNDER THESE LAWS

THE PLAN - PHASE II - COMPONENT STUDIES:

TASK A: ADOPT A PLAN

TASK B: STUDY FISCAL INPUT

TASK C: DEFINE EFFECTIVITY "OBJECTIVES"

TASK D: ESTABLISH TESTING "METHOD" TO MEASURE OBJECTIVES

TASK E: ESTABLISH SIGNIFICANT VARIABLES THROUGH WHICH THE PROGRAM BEING STUDIED OPERATES ON ITS POPULATION. DETERMINE HOW THE MEASURES OF THE POPULATION MUST BE "SCALED" TO TRULY REFLECT THE PROGRAM.

THE PLAN - PHASE II (PAGE ONE):

COMPONENT STUDIES

TASK A: PROGRAM STUDY & ADOPTION

° 1. INITIAL PLAN ADOPTED

2. SUB-COMMITTEE BEING ESTABLISHED TO CONTINUALLY MODIFY

TASK B: FISCAL STUDIES

° 1. PRELIMINARY PPBS REVIEWED

° 2. SCHOOL FINANCE METHODS REVIEWED

3. COMPREHENSIVE PPBS STUDY PLANNED

° COMPLETED

THE PLAN - PHASE II (PAGE TWO) - COMPONENT STUDIES

TASK C: OBJECTIVES

° 1. DECISION - LIMIT MODEL TO

---PUPIL POPULATION---

° 2. DECISION - PER ASSEMBLY BILL #606

---IMPROVEMENT IN READING & MATH---

3. DEFINE - THE TOTALITY OF

---MEASURABLE INSTRUCTIONAL OBJECTIVES---

WHICH CONSTITUTE READING & MATH SUCH AS:

- WORD RECOGNITION
- WORD COMPREHENSION
- COUNTING BY ROTE
- SIMPLE ADDITION

ETC.

MEASURABLE INSTRUCTIONAL OBJECTIVE = a

$a_1 + a_2 + \ldots a_1 \ldots + a_n$

= READING + MATH

° COMPLETED

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THE PLAN - PHASE II (PAGE THREE) - COMPONENT STUDIES

TASK D: METHODS

1. TESTING METHODS TO BE CHOSEN MEASURING INSTRUCTIONAL OBJECTIVES INDIVIDUALLY OR IN COMBINATION

(THESE TESTS NOT PART OF PROGRAM BEING EVALUATED)

° 2. INITIAL CONSULTATION WITH UCLA STAFF

WE SEEK, $\triangle_i$ = MEASURE OF i^{th} INSTRUCTIONAL OBJECTIVE AFTER THE PROGRAM MINUS THE MEASURE BEFORE THE PROGRAM --- i.e., GAIN IN (a_i) DUE TO THE PROGRAM OPERATING ON (N) PUPILS

° COMPLETED

THE PLAN - PHASE II (PAGE FOUR) - COMPONENT STUDIES

TASK E: SCALING

1. POSSIBLE VARIABLES
   a. INSTRUCTIONAL PERFORMANCE
   b. PUPIL POPULATION
   c. ENVIRONMENT

2. MEASURABLE MUST BE SEPARATED FROM UNMEASURABLE (DIFFICULT TO MEASURE)
   i.e., FAMILY INCOME - MEASURABLE
   PRINCIPAL'S "SMILE" - NON-MEASURABLE
3. STATISTICAL SIGNIFICANCE OF VARIABLES MUST BE ESTABLISHED

THE PLAN - PHASE II (PAGE FIVE) - COMPONENT STUDIES

TASK E: SCALING (CONTINUED)

4. PUPIL POPULATION VARIABLES FOR FUTURE STUDY INCLUDE:

   a. FAMILY INCOME
   b. BOTH PARENTS IN HOME
   c. PARENTS' EDUCATIONAL LEVEL
   d. SCHOOL TRANSFER HISTORY
   e. SEX
   f. PUPIL INTELLIGENCE
   g. PUPIL ACHIEVEMENT LEVEL
   h. ORAL FACILITY IN ENGLISH
   i. PUPIL SENSORY DIFFICULTIES
   j. FAMILY SIZE

5. SCALING FUNCTIONS MUST BE DETERMINED

   a. DIFFERENT FUNCTION FOR EACH VARIABLE (?)
   b. DIFFERENT SET OF FUNCTIONS FOR EACH INSTRUCTIONAL OBJECTIVE (?)
   c. COMBINE FUNCTIONS BY ADDITION OR BY MULTIPLICATION (?)

THE PLAN - PHASE III (PAGE ONE) - MODELING

TASK A: EXPERIMENTAL MODELING

° 1. STUDY DR. SWEIGERT'S MODEL

$$\text{COST BENEFIT} = \frac{\left[\begin{array}{c}\text{STUDENTS ACHIEVING} \\ \text{OBJECTIVE "o"}\end{array}\right] \times \left[\begin{array}{c}\text{IMPORTANCE OF} \\ \text{OBJECTIVE "o"}\end{array}\right]}{\left[\begin{array}{c}\text{COST OF PROGRAM} \\ \text{ASSIGNABLE TO OBJECTIVE "o"}\end{array}\right]}$$

2. THE DEFINITIONS OF OUR TASKS COULD BE COMBINED AS FOLLOWS:

$$\text{COST EFFECTIVENESS OF PROGRAM B} = \frac{\left[\begin{array}{c}\text{NUMBER OF} \\ \text{STUDENTS} \\ \text{INVOLVED}\end{array}\right] \times \left[\begin{array}{c}\text{MEASURED} \\ \text{GAINS IN} \\ \text{EACH } a_i\end{array}\right] \times \left[\begin{array}{c}\text{SCALED MATHEMATICALLY TO} \\ \text{ALLOW FOR VARIABLES} \\ \text{IN APPLYING PROGRAM B}\end{array}\right]}{\left[\text{COST OF PROGRAM B}\right]}$$

3. OTHER MODELS WILL BE STUDIED

4. NOTE 1. & 2. REFER TO THE FIRST LEGISLATIVE CHARGE ONLY

5. TO STUDY THE SECOND, ACHIEVEMENT MUST BE RELATED TO COST ELEMENTS

° COMPLETED

THE PLAN - PHASE III (PAGE THREE) - MODELING

TASK B: DATA COMPARISON

TASK C: PROCEDURAL DEFINITION

TASK D: PROCEDURAL EVALUATION

THE PLAN - PHASE IV - IMPLEMENTATION

TASK A: IMPLEMENTATION STUDIES

TASK B: RECOMMENDATIONS TO STATE BOARD

TASK C: SUPPORT BOARD STUDY

TASK D: REVIEW IMPLEMENTATION PROCESS
IMPROVE MODEL

TASK E: OPERATIONALLY UTILIZE MODEL

SUB-COMMITTEE REPORT ON OBJECTIVES

"THE JOB AHEAD"

Dr. Agnes Robinson

I do not have a prepared outline or statement for the committee and those present today because I did not feel I could be the prognosticator without some input from the committee itself. There was no opportunity to provide that until our meeting last night, and I did want to be sure that I was speaking for the committee as a whole.

First of all, the committee recognizes how formidable a task it has been charged with, but it also recognizes that it is just one element in a team of five committees and commissions which must interface, which must cooperate, which must move forward with a common purpose if the goals set by the legislature for these five bodies are to be achieved. They are the two commissions related to Title I and Title III, the Advisory Committee on Goals and Evaluation, the PPBS Commission which Dr. Waters is representing this morning, and the AB 606 Committee. I think the legislative goals set for this broad, representative team of five include, first of all, to establish priorities for education in this state; second, to find ways of moving children toward those goals, and certainly in a more effective fashion than this state has demonstrated since it has had mandated statewide testing; and third, to accomplish this through alternate programs that provide maximum output at least cost.

In the work of the committee to date, we have uncovered more problems than solutions or answers; and to me, this indicates that we are moving ahead in expected fashion. At least we are recognizing some of the problems that do exist. Many of these tread on very sensitive educational toes, but I think the time is past when we can afford such sensitivity because of the growing credibility gap about education, not only with respect to the public at large, but with the Legislature and Governor of this state as well. The time has come to put the cards on the table and then play the game as the cards lay. My comments will attempt to do just that.

The first task that the committee undertook was to set goals and objectives for itself and then to determine what the program objectives should be for reading and mathematics. The Bureau of Program Development in Compensatory Education has made a start on this by setting some rather broad profiles for both reading and mathematics through program objectives which are much broader based than performance or behavioral type objectives. I think we have to agree that the objectives for reading for a child in the Miller-Unruh Program are not essentially different than those for a child in the Title I program, or in a Title III program, or in a

regular school program. Means to achieve those objectives may, however, be quite different.

There are certain basic standards for reading which we expect children to accomplish and these must be identified. What are they? It might appear logical in terms of expenditures to say they are detailed for us in the state reading adoptions and the state mathematics adoptions. If they are not there, then this state is certainly wasting a tremendous amount of money on basal readers and other kinds of textbooks for grades 1 through 8. So the committee, with the help of the Department and other resource people, must identify what these broad program objectives are, on a graded basis, for these two subject matter areas.

The second task is to find that instrument which has the highest curricular or content validity for the program objectives in reading and mathematics. I say "that instrument" because I don't see how we can compare the results of pupil achievement as measured on 50 different standardized tests. Recognizing all of the inherent weaknesses of norm-referenced standardized tests, trying to compare the raw scores and derived scores, such as grade equivalents, of so many instruments becomes rather ridiculous. Identifying such a test as an output measure in no way precludes the autonomy of any district, or school, or teacher to select those strategies, including formative ongoing evaluation and diagnostic-prescriptive teaching, that will move the child toward the attainment of the objectives. But, it does provide a common denominator against which we can measure pupil progress and then compare that with costs.

The scaling of the pupil variables, or the weighting, has also been considered. I, too, had considerable difficulty in learning to interpret Mr. Ginsburgh's definition of scaling, but I made it, and I am sure you can too. In the scaling or weighting of these pupil variables, a start has certainly been made; as a result we really don't have to do a lot of "blue-skying," since there's a tremendous body of research already available in terms of those variables inherent in a pupil population which can be used as predictors of achievement.

The model Bill referred to this morning, which it was not possible to apply because of some of the data required, such as family income, can, I believe, be arrived at in other and equally valid ways. The Scaling Committee discussed this yesterday, and Mr. Kitch will be reporting more on this, this afternoon. Asking about family income may be an invasion of privacy and probably is an item which could not be generated on a pupil population other than in some gross way, such as the number of families on A.F.D.C. It would certainly be highly possible, however, to obtain information on the occupation of the principal wage earner of the family or the highest level of schooling achieved. Both of these would have high correlations with family income.

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Armed with these three kinds of decisions, I think the committee will then be prepared to look at alternate programs, alternate ways of maximizing the effectiveness of the instructional program as measured in the pupil product. To do this, we will have to satisfy many data requirements, most or all of which will have to be derived with the assistance and cooperation of the State Department of Education. Initially, perhaps a small pupil population will enable us to do some dry runs in attempting to validate whatever model is developed, then expanding to a larger pupil population. This is similar to what the PPBS Commission has done in beginning with six pilot districts and then expanding to fifteen.

The committee must be made aware of what it is feasible to request districts to provide, and I think Jim Waters has had lots of experience with this; such as, what inputs is it realistic to expect a district to generate? Because if these are unrealistic, we should exclude them from the model right at the beginning.

The committee must also know what kind of computer applications are available to it, since the volume of data that we are referring to will have to be programmed and run through data processing equipment.

The resources that the committee requires will, perhaps, be discussed at greater length by our chairman, Mr. Rosenthal. I would certainly appreciate some feedback from those present at this meeting as to the probability of the availability of some of the data and machine requirements that we are anticipating at this point in time.

SUB-COMMITTEE REPORT ON SCALING

Mr. Donald Kitch

I've tried to make a brief cumulative progress report. May I say, first of all, that I'm glad Agnes confessed this morning that we were a little bit bothered by the use of the term "scaling," as Dr. Law indicated here this morning. But Al was patient with us and after a litttle indoctrination and schooling we, I think, caught the concept that he had in mind, and it does translate into the term that we commonly use - "weighting." We've had four meetings of our sub-committee which includes Dr. Geddes, Dr. Robinson and myself. We've been fortunate in having present at all of the meetings other members of the committee because sub-committee meetings are always open to other members of the committee. This has been very comforting to us as we've wandered around in this wilderness.

We met in Sacramento, San Diego, Los Angeles, and yesterday afternoon (again) in Sacramento. At our first meeting, we attempted to pump some of the Department of Education staff members who have had experiences with programs where they had to face up to the same problems that we were trying to cope with; i.e., identifying some of these variables that Al pointed out in his report this morning as being significant. There are variables that the school has to accept, as conditioners of the learning experience that youngsters would have in any school conducted program.

As a result of these four sessions, we've come out with certain tentative results; i.e., certain recommendations and one or two comments which represent opinions or feelings. Whatever you want to call them, I'll attempt to summarize them briefly.

The first thing we set out to do really when we got down to work was to try to identify certain variables, psychological, sociological or economic in nature that would fit into this category of variables which the school had to accept and about which it really could not do too much (to start with anyhow). Al's report this morning included the list of ten (10) that we've put into our list, and I'm not going to recapitulate because I doubt if it's necessary. We recognize that this is not the kind of list that we would want to live with; this is the kind of list that we're starting with. We realize that maybe 10 variables of this type are too many and we need to do something about chopping the list down; combining perhaps, or deciding which of the variables are the ones that prove most useful in terms of what has already been done in various projects and various experimental activities (as a kind of exercise).

The next thing we tried to do was to see if we could approach the

problem of weighting these variables simply by classifying them into three categories. Category I being the one to which we would assign the greatest weight, Category II the next, and Category III the least weight. We found that we were able, just on a judgment basis, you understand, to make these categorizations without too much trouble. There was a little argument and, because this was a kind of exercise, I'm not going to try to tell you which variables fell into which category (we realize that this is just thinking).

The second step that we have taken is to raise the question as to whether or not it is the responsibility of our sub-committee to develop variables that are program related (program components for instance) or other variables that might be related to the kind of a program that is being conducted. Now we have not done this job, but we do have certain raw material that has been given to us in Committee sessions that could form the basis for beginning to approach this job.

I'd like to say that at our first meeting the input that we had was helpful to us in getting started in our thinking came from Dr. Rider; he talked with us particularly about the third grade project. Kelly Acosta who talked with us about the experiences that they've had in the Miller-Unruh program and Mr. Gustafson represented Title III. Dr. Waters was also at that first meeting and although we got a little conversation out of him, we had no formal presentation at that time; that's one reason why he's here today.

A third thing we'd like to have clearly understood is (as this kind of worried members of our Committee) we want to make it clear that as a sub-committee, we want to make plain the fact that we don't want any of the activities of this Committee to imply that anything we do is intended to exclude in any way the active encouragement of experimental programs (that is, programs which might not be tailored along the lines that we happen to be thinking). In other words, we want left clear this area of experimentation so that everybody understands that we're all in favor of experimental type programs, even if they don't fit our formulas or whatever we eventually come up with.

Another thing that became quite evident to us as we went along is the problem of data availability. This has been talked about previously and so I'm not going to say very much about it. I would like to say one thing though - we've been thinking about data availability in terms of individual pupils, not in terms of classes or schools or school districts, and we recognize that this is kind of a "toughy" in terms of whether it's available or could be made available even in a group of cooperating experimental schools. Also it's a "toughy" in terms of what are you going to do with it when you get a basketful of it. There's only one answer to that, seemingly, and that's computer services which we don't have now and which we may or may not have in the future.

A fifth item that we've given some thought to is the problem of having to translate these identified variables and their weights into some form that could be incorporated into models. When you look at the list of ten (if we decided to stick by that list of ten), those variables would not lend themselves to a common treatment. They range all the way from sex, where you'd have a bi-multiple distribution probably, to other variables that would have to be treated in an entirely different fashion. So this is a problem that we haven't really dug into yet.

Then a sixth and last item, representing an opinion of the chairman of this sub-committee - so I'm speaking for myself at this point. And, it may be that the other members will turn thumbs down on what I'm about to say, but I don't think so. I think our sub-committee has reached the point where with another working meeting or so, we would be ready to frame, at least in general form and maybe rather specific form, the kind of a work assignment that would have to be undertaken by somebody who could devote full time for a period of six months or so; e.g., to evaluate the research that has been conducted so that they can tell us which of these ten variables that we are playing with now are really significant, or are likely to be truly significant; and can back up their recommendation with something based on experimentation. There is a task that needs to be undertaken.

We need some expert help with this problem of trying to scale each of the variables; and I don't see how members of our sub-committee are ever going to have time to really any more than just outline this job. Somehow or another, we're going to have to find some way to get some service, either through a contractual arrangement or some other way, maybe free service. Lou down here thinks he's a pretty good recruiter of free services.

(Dr. Lewis Kohler interrputed to say, "I don't say that I can get people for nothing. I don't know of anyone who will work for nothing. They work for cash.")

Yes, but your interpretation of nothing is a little different from zero dollars. Well, that concludes my report, Mr. Chairman.

SUB-COMMITTEE REPORT ON MEASUREMENT

Dr. John Geddes

First, we've reviewed a fair amount of information concerning measurement and Dr. McCormick has prepared a statement that is brief and I think rather summarizes our information to date. There are two positions taken when educators consider the assessment of learning performance (this is very brief - very summary and I'm sure leaves out a wealth of information, but nevertheless as a general statement, I think it's significant).

One position is that the domain to be tested is very large, consisting of knowledge about a vast amount of materials and that assessment consists of a sampling from this domain. Traditional performance testing is based upon this premise and allows a rating of individuals or groups. These normative tests do not sample how effective a program achieves its specific objectives; for example, a pullout remedial reading program.

Criterion-referenced tests have a local educational program in mind; the items are matched to the specific objectives of the instructional staff and thus they provide feedback for modification of the local program. As the demand for increased effectiveness is growing, the development of criterion-referenced test items, that measure specific skills, is also increasing. It is generally accepted that criterion-referenced tests are of use in efforts to individualize instruction.

Although criterion-referenced tests are in a developmental stage, there are a number of places throughout the country that are working in this area (one is the Center for Evaluation at UCLA). There are problems in attempting to use criterion-referenced tests for assessing the outcomes of educational progress. The contents and the order of presenting the learning units are not uniform across schools. In fact, the trend is toward program development at an individual school level. In addition, programs are modified periodically during the school year.

Secondly, the Measurement Sub-committee is planning:

1. The continuing broadening of the total committee's understanding of educational measurement.

2. To invite specialists working in the area of the evaluation of educational programs, to consider how best to measure pupil variables affecting pupil achievement as identified in Mr. Kitch's Scaling report. (Also, it was in the report that Mr. Ginsburgh gave.)

3. To invite specialists from UCLA and other institutions

to survey and report on the state of the art of measurement of program effectiveness. I would certainly hope that we may also draw upon the resources of the Department in this and hopefully, unite certain people in the Department with certain people in the top educational institutions in the United States, all of whom are working on this area. I think that would be a very profitable objective.

4. To determine State Department of Education progress on the measurement of program effectiveness and to develop a closer planning and working relationship that would be representative of the State Department of Education.

5. To involve certain schools early in the planning of what measurement techniques are reasonable to utilize in our schools. As we begin to work into the area of model building, where we're beginning to see what kinds of measurements we should put into this appraisal process, the measurement techniques should go very early into a few individual schools to make sure that what we are building is really practical and workable; so that we produce something which already has had a parallel testing at an operational level in the schools.

Thirdly, we place our highest priority in the following two endeavors which we expect to carry out in parallel.

1. The first is to survey and report on the state of the art of measurement of program effectiveness. Assistant Chancellor Svenson of UCLA has expressed an interest in helping us to do this.

2. In addition, we wish to invite the State Department of Education to share with this committee their progress and problems in attempting to measure program effectiveness.

REPORT TO THE CALIFORNIA STATE BOARD OF EDUCATION

With the completion of Phase I of the work plan, the Advisory Committee on Program and Cost Effectiveness prepared a report of their progress and findings to the State Board of Education.

WILSON RILES
Superintendent of Public Instruction
and Director of Education

STATE OF CALIFORNIA
DEPARTMENT OF EDUCATION
STATE EDUCATION BUILDING, 721 CAPITOL MALL, SACRAMENTO 95814

May 25, 1971

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The Honorable Wilson C. Riles
Superintendent of Public Instruction
California State Department of Education
721 Capitol Mall
Sacramento, California 95814

Dear Dr. Riles:

I am pleased to submit to you a report from the Advisory Committee on Program and Cost Effectiveness as required by the Education Code, Section 6499.203.

This report reflects the diligent effort of the Committee since its inception in March, 1970.

The Committee is composed of three members representing business management, Mr. Morris Currey (resigned May, 1971), Mr. Allen Ginsburgh and Mr. Leo Newsome (resigned November, 1970); three members representing economics and finance, Dr. Lewis Kohler, Mr. Clarence Newby, C.P.A. and Mr. Alvin Rosenthal, C.P.A.; and three members from the learning sciences, Dr. John Geddes, Mr. Donald Kitch and Dr. Agnes Robinson. As chairman I am indebted to them for their time and conscientious labor.

The Committee wishes to thank the State Department of Education for its assistance and cooperation in this endeavor.

Respectfully submitted,

Alvin L. Rosenthal

Alvin L. Rosenthal, Chairman
Advisory Committee on Program
and Cost Effectiveness

REPORT TO THE STATE BOARD FROM THE ADVISORY COMMITTEE ON PROGRAM AND COST EFFECTIVENESS

The enabling legislation, AB 606, (California Legislature, 1969) as modified by AB 1923 (California Legislature, 1970) states:

> *"The Advisory Committee on Program and Cost Effectiveness shall develop and recommend to the State Board of Education a methodology for evaluating the cost effectiveness of projects financed by Titles I and III of the Elementary and Secondary Education Act of 1965, Miller-Unruh Basic Reading Act of 1965 . . ."*

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DEFINITION OF COST EFFECTIVENESS

In the context of this report cost effectiveness may be defined as a management decision process which allows the decision maker to choose from among feasible alternatives on the basis of least costs and maximum program output as measured by student achievement.

DELIMITATION OF COMMITTEE'S TASK

This report will summarize the findings of the committee for the first calendar year of the operation. Pursuant to the legislative mandate, this report will be limited to findings and recommendations necessary to develop cost-effectiveness methodologies for educational programs financed under ESEA Title I, ESEA Title III, and the Miller-Unruh Basic Reading Act of 1965. Further, the content of this report is focused on the reading and mathematics components of the above-mentioned educational programs and the pupil populations served by these programs.

To the best belief of the committee, the findings and recommendations in this report are congruent with the findings of other statutory committees and commissions whose functions are related to this committee and with the plans of the California State Department of Education. The findings and recommendations contained in this report are based on the testimony, exhibits, and investigation of the committee and are presented for the guidance of the State Board of Education.

DEVELOPMENT OF COST-EFFECTIVENESS MODEL

The development of the cost-effectiveness model is contingent upon these five components which, taken together, will produce a common methodology for the estimation and evaluation of the relative cost effectiveness of educational programs in reading and mathematics. These are as follows:

1. Establishment of terminal objectives by grade
2. Measurement of pupil achievement evaluated for content validity
3. Weight of pupil characteristics - establish research on which characteristics have effect on learning
4. Resource allocation - (direct and indirect dollar cost)
5. Documentation - all program elements, methodology, staffing, etc.

It is the conclusion of the committee that without the development of these constituent parts a model as such cannot be developed. Consequently, the committee has focused on the description and explication of these component parts as a necessary first step to the development of a cost-effectiveness methodology. This report presents these findings and recommendations.

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FINDINGS AND RECOMMENDATIONS

Finding No. 1

While individual teachers, schools and districts have developed specific performance objectives against which to measure the achievement of their students in reading and mathematics, there is not within the state of California a common set of achievement objectives in reading and mathematics for grades 1-8 by which the output of these programs can be compared.

Recommendation for Finding No. 1

There should be established for each component of the reading program (e.g., word study skills, comprehension, and reference skills) and for each component of the mathematics program (e.g., sets, numbers and numerals and geometry), statements of terminal objectives by grade, for grades 1-8. These objectives must be stated in measurable terms and should be derived from the basic state-adopted textbooks for reading and mathematics. The implementation of this recommendation in no way limits individual schools and districts in the selection of materials, methodologies, and development of performance objectives for students essential to meet the pupil and teacher needs represented by individual school districts.

Finding No. 2

Recognizing the existence of the Miller-Unruh state achievement testing program for reading in grades 1-3 and the mandated

state achievement testing program for reading and mathematics in grades 6 and 12, there still is little consistent or systematic procedures for the measurement of the change in pupil performance that can be directly related to the instructional program of individual schools. Further, there is little relationship between existing measurement practices in schools, the reading and mathematics curriculum embodied in the basic state-adopted textbook and the terminal objectives indicated in Finding No. 1 above.

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Recommendation for Finding No. 2

There should be established in the state of California an improved method for systematically evaluating student achievement in reading and mathematics through the use of standardized testing instruments which have the highest possible relationship to the terminal objectives for reading and mathematics referred to above. In addition, classroom teachers should be encouraged to evaluate their programs during their instructional process with locally constructed tests (criterion referenced tests). Periodic reviews of the standardized tests should be made by the State Department of Education to insure a continuing high relationship to the terminal objectives of reading and mathematics referred to in Finding No. 1 above, and changes in basic state textbooks for reading and mathematics as adopted by the State Board of Education.

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Finding No. 3

Individuals as well as pupil population differ in their ability to profit from instructional programs. Some of these differences (variables) are: (1) socio-economic background; (2) ability to communicate in English; (3) educational level of the parents; and (4) family mobility. In evaluating the programs in reading and mathematics it is necessary to identify those differences (variables) which are significant in the pupil's attainment of terminal objectives in reading and mathematics. Determining the relative significance of these differences (variables) requires the development of a method for weighting them in terms of their effect on pupil achievement in reading and mathematics.

Recommendation for Finding No. 3

A thorough study of available research reports is needed to identify the most important of these variables and to provide the basis for weighting them in terms of their relative significance. This will make it possible to incorporate them into a cost-effectiveness methodology along with the results of the evaluation discussed in Finding and Recommendation No. 2.

Finding No. 4

From the evidence heard by the committee, it is clear that there does not exist at this time an adequate method by which direct and indirect costs (resource allocations) for a particular instructional program may be readily determined at the school and at the classroom level.

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Recommendation for Finding No. 4

In order to provide the data necessary in evaluating program and cost effectiveness, a revision of the state accounting manual and guidelines for Title I, III, and Miller-Unruh programs should be made, utilizing the experience gained in commercial and industrial cost accounting applications.

The forthcoming Planning, Programming, Budgeting System (PPBS) accounting system must be supplemented by school district's accounting departments to the end of developing more detailed direct and indirect costs extending down to the classroom level. The State should provide leadership in developing and promoting the use of such accounting systems.

In addition, it is recommended that programs funded with categorical aid should require as a condition to their funding provision for the establishment of specialized cost accounting systems and the reimbursement for same, in order to provide the data needed to develop cost factors at the school and classroom levels.

Finding No. 5

There is a critical need to reproduce cost-effective programs to prevent unnecessary duplication of effort, and to disseminate these findings. For this to be accomplished, full documentation of program components, evaluation techniques, and identification of direct and indirect costs (resource allocations) is necessary.

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Recommendation for Finding No. 5

The State Department of Education must require that each program applicant submit an application and annual report which includes the description of all program and cost factors in sufficient detail. In addition, the State Department of Education should develop procedures for the dissemination of information on programs which have been determined to be cost effective.

CONCLUSIONS

These findings and recommendations synthesize the reports prepared by the subcommittees on planning, objectives, measurement, weighting, finance and accounting, and the meetings and work of the committee as a whole. The subcommittee reports and minutes of the committee are available.

This report concludes Phase I of the charge given to the Committee on Program and Cost Effectiveness by the California State Legislature and embodied in the Education Code, Section 6499.204.

With acceptance of this report, the committee would like to institute work on Phase II, the production of cost-effectiveness models based on data obtained from experimental and pilot programs, funded from the various sources of categorical aid, including State funds.

Alvin L. Rosenthal, Chairman
John A. Geddes, Vice-Chairman
Allen S. Ginsburgh
Donald E. Kitch
Lewis T. Kohler
Clarence Newby
Agnes S. Robinson

THE RIVERSIDE PROJECT

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Rationale for Project

Phase II of the Work Plan called for a study of the several components that the Committee felt to be important in the development of the methodology for assessing cost effectiveness. The Committee had spent a considerable amount of time during Phase I becoming acquainted with the scope of the problem and had developed some hypotheses as to the kinds of factors to be considered in any methodology that was to be developed.

In order to test these hypotheses and gather further data, the Committee felt it would be helpful to have access to a school district which could serve as a laboratory in which to collect, examine and analyze data. The Riverside Unified School District was asked to participate in this venture because it had successfully completed a project in reading and math and this would allow for the problems of replication, as well as the documentation of the several components of the project, to be studied.

Expectations from the Project

It was recognized that the specific results obtained from the Riverside project could not be generalized to apply to all other situations or be the sole source of data for the Committee. It was also understood that the actual achievement scores obtained by the students were not as important as the procedures developed for the collection and processing of data from the project. The Committee did not expect a methodology for assessing cost effectiveness to emerge full blown from this project. What it did expect was that by the use of live data in a real school setting, the Committee might obtain a better understanding of the elements being studied and identify practical problems that would not otherwise be discovered. It was also hoped that the results of this project would give direction to the establishing of a baseline for future studies regarding the relative importance of selected variables in the prediction of performance in reading and mathematics and to the development of a methodology for assessing program cost effectiveness.

The specific outputs expected from the Riverside project included the following items:

1. A cost system that would be capable of identifying program costs at the subject, course, component and subcomponent levels, and a description of how each of these cost units would be identified and collected.

2. A listing of instructional objectives.

3. An evaluation design.

4. The collection of data pertaining to student characteristics including such items as:

   a. Lorge-Thorndike IQ scores; verbal, nonverbal, total.

   b. Socioeconomic index based on father's occupation.

   c. Mobility index.

   d. Sex.

   e. Chronological age.

   f. Number of siblings in the home.

   g. Number of unexcused absences.

   h. Ethnic background.

   i. Other data as deemed appropriate.

5. The collection of data pertaining to teacher characteristics including such items as:

   a. Age.

   b. Sex.

   c. Years of teaching experience.

   d. Number of units of professional courses.

   e. Number of units of academic courses.

   f. Salary level.

   g. Number of years in the district.

   h. Number of units taken in college after employment in the district.

   i. Selected dimensions of teaching performance as deemed appropriate.

6. Documentation of all aspects of the project necessary for understanding and replication including:

   a. Preliminary planning required.

   b. Staffing.

   c. Course content.

d. Teaching strategies.

e. Classroom organization.

f. Evaluation criteria and measuring devices.

g. Staff inservice training required.

h. Procedures for collection of all data.

i. Treatment of data.

j. Other items as required for project replication.

7. Analysis and statistical treatment of the data collected with interpretation as appropriate.

Project Design

Following the selection of Central Junior High School as the project site and the approval of funds for the project, Riverside Unified School District submitted a research design which was accepted by the Committee.

RIVERSIDE UNIFIED SCHOOL DISTRICT
Riverside, California

October, 1971

RESEARCH DESIGN FOR THE COST EFFECTIVENESS STUDY

Introduction

Enabling legislation, A.B. 606 (California Legislature, 1969) modified by A.B. 1923 (California Legislature, 1970) directed the Advisory Committee on Program and Cost Effectiveness to "develop and recommend to the State Board of Education a methodology for evaluating the cost effectiveness of projects financed by Title I and III of the Elementary and Secondary Education Act of 1965, Miller-Unruh Basic Reading Act of 1965 . . ."

Phase I activities of the Commission resulted in the description and explication of five components necessary to the development of a common methodology for the estimation and evaluation of the relative cost effectiveness of educational programs in reading and mathematics.

Phase II activities of the Commission will include the production of cost effectiveness models based on data obtained from experimental and pilot programs.

With the cooperation and support of the California State Department of Education, a Demonstration Program in Intensive Instruction in Reading and Mathematics for Low Achieving Pupils, as authorized under Education Code 6490ff., was approved for the Riverside Unified School District. Funds amounting to $84,469 were allocated for the study. Central Junior High School in Riverside was selected as the site for the project with the total seventh grade class (approximately 370 students) forming the student population. Eleven teachers and the chairmen of the English and mathematics departments will be included.

An effort will be made to ascertain the relative importance of each of several student related variables, teacher characteristics, and components of instruction to the prediction of performance in reading and in mathematics within the framework of cost effectiveness.

Objectives

The overall objectives of the study are:

1. To develop a model system for determining the cost effectiveness of public school instruction at the

classroom level. The system will include

a. the specification of instructional objectives,
b. the development and application of an evaluation design,
c. the collection of pertinent student and teacher characteristics,
d. the development of a cost accounting system capable of generating all applicable direct and indirect costs, and
e. procedures for documenting all components.

2. To assess an ongoing seventh grade program of reading and mathematics in order to demonstrate the applicability of the model.

3. To determine which variables of students and teachers, and of the instructional programs involved are the most significant for success.

Analysis of Data

A multiple regression model involving double cross validation will be employed relative to each criterion variable and selected combinations of predictor variables--the selections being based on both empirical information derived from the intercorrelation of the predictor variables and from their correlations with the criterion measures and logical analyses of the cost factors involved in the obtaining of information on the predictor variables. The double cross validation procedure will necessitate taking two samples consisting of odd numbered students and even numbered students, of working out for each sample the same sets of multiple regression equations, of comparing the relative contributions of each of the independent variables to the criterion variables in each set of equations, and of employing the regression equation derived from one group upon the other group to ascertain how much shrinkage because of sampling factors occurs in the multiple correlations (of predicted scores for one group from the equation of the second group with the obtained scores of the first group). Stepwise multiple regression procedures will be used which permit the selection of composites of variables in order of the contribution of each variable to the prediction of the criterion. Logical selection of variables will also be made in terms of certain practical considerations.

Limitations of the Study

The use of only one school within a given district leads to certain disadvantages or limitations in an accountablility study. There will be no basis for comparison of what happens in the school

involved with other schools or districts. Consideration cannot be given to differences or variations in variables such as class size, tax rates, assessed valuations, ADA, rate of staff turnover, and salary schedules. These variables are in essence fixed. The data obtained in the present study will probably use the individual student as the sampling unit, and any gains studied are likely to be highly unreliable in view of the fact that they are primarily directed toward the individual student or a few classes.

On the other hand, a relatively high degree of control can probably be realized in this investigation, as the project personnel can monitor what goes on in the classroom.

Variables in the Investigation

Dependent Variables

The dependent variables will consist of reading and mathematics portions of the Comprehensive Tests of Basic Skills, Level 3, Form Q. These tests are being administered on both a pre and posttest basis. In addition, several of the teacher-made tests which have been anchored to carefully prepared behavioral objectives, will also be used as criterion variables. Scores used will be obtained from tests administered at the end of the school year. The pretests may be used also in the context of predictor variables.

Independent Variables

The independent variables will consist of those pertaining to student characteristics, teacher characteristics, and components of instruction. Suggestions are presented below of several possible predictor variables.

Student characteristics--Among the student-related variables will be:

(1) Lorge-Thorndike IQ scores--Verbal, Nonverbal, and/or Total;
(2) socioeconomic status based on father's occupation;
(3) mobility index;
(4) sex;
(5) chronological age;
(6) number of siblings in home;
(7) number of unexcused absences;
(8) intellectual achievement responsibility as measured by The Intellectual Achievement Responsibility Questionnaire (Crandall, Katkovsky, and Crandall);
(9) need achievement as measured by Mathematics Self-concept Questionnaire (Holly);
(10) study attitudes and methods determined by modifications of Study Attitudes and Methods Survey (Michael, Michael, and Zimmerman).

Teacher characteristics--The following teacher attributes will be considered as variables to serve as predictors:

(1) age;
(2) sex;
(3) years of teaching experience;
(4) number of units of professional courses;
(5) number of units of academic courses;
(6) salary level;
(7) number of years in district;
(8) number of units taken in college after employment in district;
(9) selected dimensions of teaching performance as determined by student evaluations.

The inclusion of this information in the regression equation will be complicated since each student who has a given teacher will be assigned the same score on the relevant variable for that teacher; hence the variance may be limited, or separate analyses may have to be made for groups of students who have teachers with common characteristics. Possibly two groups of teachers who represent marked contrasts in certain combinations of attributes will be associated with subgroups of students for whom separate multiple regression analyses will be made. Discriminant analyses may also be employed.

Components of instruction--Variables within classrooms include numbers of students and amounts of instructional time spent in

a. large group instruction
b. small group instruction
c. laboratory experience
d. independent work.

In addition, each classroom will be rated in the following four principal areas of educational procedure

a. individualization
b. interpersonal regard
c. creative expression and divergency of thinking
d. group activity.

Analysis of the data described above will result in a detailed assessment of the cost effectiveness of the Central Junior High School seventh grade instructional programs in two basic subject areas. From the results of the study it will be possible to suggest a model system to be used elsewhere for a similar purpose.

Instructional Program

The content areas to be covered in the project were reading and mathematics, and the student population was the total seventh grade

at Central Junior High School. The distinctive aspect of the program was the manner in which individualization of instruction was accomplished.

In the Reading program the curriculum was carefully analyzed and specific performance objectives were written for each of the areas of skills or knowledge where it was desired that student learning take place. Criterion-referenced tests were developed to assess the degree of achievement for each of the objectives. Teaching strategies included the use of Learning Activity Packages (LAPS) designed to teach each of the objectives, large group instruction, small group instruction, independent study and laboratory work with such machines as the Hoffman, controlled reader, cassette players, filmstrips and reading pacers.

The Math program attempted to individualize the program by grouping within the classroom and careful record keeping of individual student progress as a basis for assigning and reassigning to groups. Extensive use was made of calculating machines.

Examples of performance objectives and criterion-referenced tests are included here, and complete sets are on file at the Riverside School District and in the Committee's permanent file.

GOAL		BEHAVIOR
INTERPRETATIVE COMPREHENSION	Relationships	1. Given a paragraph or passage stating one or more cause effect relationships, the student will be able to match causes with effects.
		2. Given a passage containing an inferred cause and effect relationship, the student will identify the portion of the passage which infers that relationship.
		3. Given a list of phrases revealing a time sequence, the student will arrange them in chronological order.
		4. Given a scrambled sequence of material and a heading, the student will arrange the material in proper order under the heading.
		5. Given a story to read and five statements listing incidents of the plot, the student without looking back at the story will be able to arrange the statements in the sequence in which they occurred in the story.
		6. Given analogies such as "A bat is to baseball as a ? is to tennis," the student will be able to supply the missing word.

Directions: Read the story. Decide which of the words given below belongs in each sentence. Fill in the space by the correct letter for the answer to each question. Use answer sheet B.

WORKER DIAMONDS

Glittering gems called diamonds are among the most precious of human possessions. Through the ages they have been a lasting evidence of wealth. Lands may lose their soil, buildings may be destroyed, stocks and bonds may become worthless, but the value of diamonds remains relatively unchanged.

Diamonds are not of value only as signs of wealth. In addition, the diamond is one of the hardest, longest-wearing substances known to man. Because of this, it is very valuable for practical use. In fact, about three-fourths of the total annual supply of diamonds is used in factories and machine shops.

A diamond on the end of a cutting tool can cut through the hardest steel, but only a diamond can cut another diamond. Because of their unusual hardness, diamonds are used to sharpen grinding wheels. They are placed on the tips of the grinding drills used to cut through tons of bed rock. In scores of other ways, diamonds are essential to turning the wheels of modern machinery.

About 4 1/2 tons of diamonds are mined annually. The vast diamond mines of South Africa produce most of these diamonds, but in recent years many diamonds have also come from Brazil.

Questions:

1. The diamond is one of the _____, longest-wearing substances known to man.
2. In recent years many diamonds have come from _____.
3. Only a _____ can cut another diamond.
4. About three-fourths of the total annual supply of diamonds is used in _____.
5. The value of diamonds remains relatively _____.
6. _____ called diamonds are among the most precious of human possessions.

7. A diamond can cut through the hardest _____.

8. Diamonds are used to _____ grinding wheels.

9. About 4 1/2 tons of diamonds are _____ annually.

10. Diamonds are _____ to turning the wheels of modern machinery.

Choose from these answers. Mark answer sheet.

A. factories	F. Brazil
B. sharpen	G. unchanged
C. gems	H. steel
D. hardest	I. essential
E. mined	J. diamond

Test Filing No. LC lp/1/10-10

Behavioral Objectives for Level A of the
Prescriptive Mathematics Inventory (PMI)

NUMERATION SYSTEMS

Form	Item No.	
		Pictorial Sets
3	1	1. Given a set of less than 10 elements, the student will count the elements.
3	2	2. Given a set containing whole numbers as elements, the student will identify all elements that are "more" or "less" than a given number.
		Place Value
3	3	3. Given a one-, two-, or three-digit number, the student will specify the value of each digit in the numeral.
3	4	4. The student will specify the value of each digit in a four- or five-place numeral.
3	5	5. The student will specify the value of each digit in a numeral of nine or fewer digits.
3	6	6. The student will specify the value of each digit in a decimal number between 0 and 0.999.
3	7	7. The student will specify the value of each digit in a decimal number of four or five decimal places.
		Expanded Notation
3	8	8. The student will formulate a three-digit numeral from the expanded form of the number.
3	9	9. The student will formulate a four-digit numeral from the expanded form of the number.
3	10	10. The student will formulate a five-digit numeral from the expanded form of the number, which form uses exponents to the base 10.

Costs

The development of the accounting system for this project was a joint effort on the part of Mr. Walter Parks, Business Manager of the Riverside Unified School District, and his staff, together with Mr. Clarence Newby and members of his Sub-committee on Costs of the Advisory Committee on Program and Cost Effectiveness. The cost system was developed for the purpose of identifying and collecting costs in sufficient detail so that units within the classroom could be identified and costs determined. A format of reporting these costs, if used by other projects, would allow for a cost comparison of total programs or equivalent parts of different programs. The system was designed to be compatible with the PPBS, being designed at the State level. The cost system, as developed for the Riverside project, has been reported in a previous chapter under the report of the Sub-committee on Costs.

COST SYSTEM OBJECTIVE

To develop a cost system capable of generating all applicable direct and indirect costs for a school district to the following levels:

- Department or Project
  - Location
    - Function
      - Life Span
        - Program
          - Course
            - Course Components
              - Sub Components
                - Objectives
                  - Sub Objects

COST SYSTEM OUTLINE

1. Statement of objectives
2. Procedure statement
3. Final report format
4. Explanation of function headings
5. Account number structure
6. Account number example
7. Time card sample

COST SYSTEM

General Procedure

The cost system designed for the AB 938 Cost Effectiveness project permits the development of both direct and indirect costs from all sources for any desired level of the instructional program. The main focus is centered on the course level of the total program structure and the final reporting will be on a per course basis.

To relate this to the PPBS program structure, the course level is Level VI, the subject area sub-classification. Journalism, literature, reading and speech would be Level VI courses within the English program or department, Level V.

Further detail is possible by breaking each course into components (Level VII) or even into sub-components (Level VIII) if necessary. A component would be any subdivision of a course for which it is desirable to maintain costs. These could be teaching techniques or subprograms designed to meet certain objectives. Examples for the course, "Reading-Seventh Grade," might be large group instruction and tutorial instruction.

Course components which are not strictly instructional such as research and development can be included in the program structure. Research and development costs are imposed when the project is experimental in nature or when an existing course is imposed or modified. Both of these, the so-called "tool up" and the "on-going" research and development costs, are combined into one component for the AB 938 Cost Effectiveness program currently under study at Central Junior High.

The final cost statement for Central's program would consist of two final report forms, one each for reading and math. Costs are summarized under each course component on the final report form by nine functional headings. These are: (1) instructional salaries, (2) instructional materials, (3) testing materials, (4) project administration salaries, (5) books, (6) equipment, (7) facilities, (8) transportation, and (9) administration and services.

Because of the design of the function headings, which include several items which must be prorated, all of the costs cannot be accumulated in the appropriation ledger through the regular accounting process. Therefore, a separate cost ledger must be maintained and entries made from several sources for each course. The final report is prepared from the summarized cost-ledger data.

Also proration schedules must be established and maintained for each course. This will permit equipment, books, and related items with a life greater than one year to be prorated over their useful life rather than lumping the entire cost into the year of purchase.

When a course or project is first brought into the cost system, an inventory of equipment and other assets of significant value must be inventoried, valued, and a proration schedule established. These on-hand assets then can be regularly charged to the cost ledger via the proration schedules.

This system requires that time sheets and time and material sheets be maintained to develop the cost of instructional salaries for each component of a course and other direct costs from sources within the district.

Entries into the cost ledger then will be from several sources including the appropriation ledger, the proration schedules, the time sheets, and the time and material sheets.

INSTRUCTIONAL SALARIES

Definition

Instructional salaries are defined as the salaries of those individuals who are directly involved with the teaching of students. This would include the salaries of teachers, classroom aides, specialists working within the classroom, and counselors if working on course-related problems. Teacher and aide salaries are charged at a standard cost rate. Other salaries are charged at the actual rate of pay for each individual.

Source of Cost Information

Instructional salaries for each course and course component are predetermined as closely as possible as part of the budgeting process. The final budget will reflect in detail these predetermined estimates. During the year each individual involved will submit time cards weekly detailing the actual time involved with each course or component. See sample time card. These are posted directly to the cost ledger.

Applicable Account Numbers

Teacher	0213.094 xx xxx xxx
Aide	0220.194 xx xxx xxx
Counselor	0214.294 xx xxx xxx

INSTRUCTIONAL MATERIALS

Definition

Instructional materials are defined as those items purchased specifically for a course which would ordinarily be consumed within one year or for which the primary period of use is during the first year after purchase. These include materials, periodicals, magazines, workbooks, postage, film rental, travel conferences, hand tools and low-cost equipment. Large expensive equipment are excluded from this category.

Source of Cost Information

Most instructional material costs are charged directly to the appropriation ledger from the purchase orders. They are accumulated automatically by account number as part of the bookkeeping process. Charges which have to be prorated among several accounts can be

accomplished with journal entries to the appropriation ledger or with prorated entries to the cost ledger.

Applicable Account Numbers

Instructional Supplies	0290.194 xx xxx xxx
Mileage	0291.194 xx xxx xxx
Conference	0291.294 xx xxx xxx
Printing	0291.394 xx xxx xxx
Magazines	0292.594 xx xxx xxx
Workbooks	0292.694 xx xxx xxx

TESTING MATERIALS AND SCORING

Definition

Testing materials are those pre and post tests plus related materials which are used as part of the measuring process for an individual course.

Scoring includes the costs of service agencies, district computer and computer personnel time, and the costs of hand scoring.

Source of Cost Information

The costs of tests, materials, and service agencies are charged from the purchase orders directly to and accumulated in the appropriation ledger, the same as Instructional Materials described above.

District employees involved with computer or hand scoring must submit time and material sheets detailing the time involved with each course or component. These are posted directly to the cost ledger.

Applicable Account Numbers

Testing Materials	0294.194 xx xxx xxx
Scoring	0294.294 xx xxx xxx

PROJECT ADMINISTRATION SALARIES

Definition

A course or a group of courses may be designated as a special project usually with special funding. The project director is defined as that individual directly responsible for all activities of the project. Other examples of project administration salaries include specialists, secretaries, evaluators, and cost accountants.

Source of Cost Information

Project administration salaries for each course and course component are predetermined as closely as possible as part of the budgeting process. The final budget will reflect in detail these predetermined estimates. During the year each individual involved will submit time cards weekly detailing the actual time involved with each course or component. These are posted directly to the cost ledger.

Applicable Account Number

Project Administrator	0212.043 xx xxx xxx
Secretary	0220.043 xx xxx xxx

BOOKS

Definition

Books are defined as all textbooks, supplementary books, and library books with a useful life of greater than one year. Pocket books, workbooks, and other book-like materials are charged to Instructional Materials if their useful life is less than one year.

Source of Cost Information

The total cost of the books will be charged to the appropriation ledger from the purchase orders. The total accumulated cost for each category is divided by the average life for textbooks. The resultant amounts are set up in a proration schedule and charged accordingly to the cost ledger.

Applicable Account Numbers

Textbooks	0230.194 xx xxx xxx
Supplementary books	0241.194 xx xxx xxx
Library books	0240.194 xx xxx xxx

EQUIPMENT

Definition

Equipment is defined as physical property with a relatively high permanent value. Equipment is usually movable in contrast to building fixtures or site improvements. Items of relatively low cost which are consumed for the most part within one year should be charged to Instructional Materials. Repairs to equipment are also part of this function.

Source of Cost Information

The total cost of any equipment and replacement equipment will be charged directly to the appropriation ledger from the purchase orders. Charges are made each year from the proration schedule to the cost ledger. For each piece or group of equipment, a proration schedule must be established, based on the estimated useful life of the equipment and its total cost from the appropriation ledger less its residual value.

Equipment on hand at the beginning of a course or project should be inventoried and a proration schedule developed based on the remaining value and useful life. Equipment transferred into the course during the year from other sources should be similarly valued and charged.

Repairs by outside vendors are accumulated directly in the appropriation ledger from purchase orders. Work performed by district personnel must be recorded on time and materials sheets from which the costs are transferred to the cost ledger.

Applicable Account Numbers

Equipment	1272.094 xx xxx xxx
Repairs to instructional equipment	0791.1xx xx xxx xxx

TRANSPORTATION

Definition

Transportation is defined as the cost of transporting students for reasons specifically related to the individual course. This includes primarily field trips and transportation between schools for the purpose of attendance in certain courses. Ordinary home-to-school transportation is excluded. This cost is part of the prorated administrative and service costs.

Source of Cost Information

Field trips and other special transportation are charged directly to the appropriation ledger from field trip purchase orders. These are accumulated automatically as part of the bookkeeping process. Charges which have to be prorated among several accounts can be accomplished with journal entries to the appropriation ledger or with prorated entries to the cost ledger.

Applicable Account Numbers

Field trips	0590.294

FACILITIES

Definition

Facilities are defined as all of those costs related to providing space for a course or project. These include the building, the building fixtures, the maintenance and custodial functions, and utilities. Ordinary classroom furniture may be considered a facility cost rather than an equipment cost. Furniture purchased for or peculiar to a specific course or project would be charged under equipment.

Source of Cost Information

Building and building fixture costs are developed from a standard districtwide per square-foot charge. A computation will be made for each course and component and entered directly into the cost ledger.

Maintenance and custodial costs are based on a districtwide per-pupil cost for the Maintenance and Operations department. The per-pupil cost times the number of pupils involved in each course or component are entered directly into the cost ledger.

Utilities costs are accumulated in the appropriation ledger by school location. These are prorated to each course on a per-pupil basis.

ADMINISTRATION AND SERVICES

Definition

Administration and service costs are defined as all other costs not covered in the previous categories. These usually are noninstructional school and overall district costs which are prorated to the individual course or component.

Included are principal, vice principal, secretary, superintendent's office, business office, psychological services, attendance, audio visual, personnel, home-to-school transportation, and other administrative and service departments.

Source of Cost Information

All administrative and service costs are prorated on the basis of cost per ADA. School administration costs would be divided by the total school ADA and the resultant per ADA cost is charged to the individual course or component. In this same manner, district costs are divided by the total district ADA and the resultant per ADA cost charged accordingly.

Account Number Example

Function	Object	Sub Object	Department or Project	Location	Program	Course	Course Component	Sub Component	Life Span
Instruction 02	Other Expenses 9	Supplies 00	Cost Effectiveness 42	Central 81	English	Reading 043	Develop-ment	Objectives 01	Seven 3
Instruction 02	Certificated Salary 1	Teachers 30	Classroom instruction 94	Central 81	English	Reading 043	Large Group	Lecture 26	Seven 3

LAB REPORT SHEET

Student _____ Teacher _____

Period _____

Each time you work in the lab, please specify the date and check the type of materials with which you worked.

Date	Machines					Programmed Materials (LAPS, etc.)	Worked with Tutor	Other-Specify
	Hoffman	Controlled Reader	Cassette Player	Filmstrip	Pacers			

DAILY ACCOUNT OF ENGLISH PROGRAM COMPONENTS

Period _____

Month _____ Teacher _____

		First Week					Second Week					Third Week					Fourth Week					Fifth Week				
		Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri
Large group Instruction	Students																									
	Time																									
Small group Instruction	Students																									
	Time																									
Lab	Students																									
	Time																									
Independent Work	Students																									
	Time																									

Teachers: Please record daily the number of students who participate in each component and the amount of time they spend in that component.

RECORD OF PERFORMANCE ON CRITERION-REFERENCED TESTS

Student _____ Teacher _____

Period _____

OBJECTIVE	CTBS	Date	P/PP	Test No.	Pass/ Fail	Date	P/PP	Test No.	Pass/ Fail	Date	P/PP	Test No.	Pass/ Fail
Literal Comprehension													
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
Interpretative Comprehension													
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
Application of Reading Skills													
1													

AB 938 COST EFFECTIVENESS PROJECT
Cost Accounting System

Final Rep rt

RIVERSIDE UNIFIED SCHOOL DISTRICT

School Central Junior High
Program Junior High Reading
Course Seventh Grade Reading

Function	Total	Components and Sub Components							
		IN CLASS				OUT OF CLASS			RESEARCH and DEVELOP.
		LARGE GROUP	SMALL GROUP	INDIVIDUAL INSTRUCT.	LAB WORK	GRADING	RECORD KEEPING	PREPA-RATION	
1. Instructional Salaries									
2. Instructional Materials									
3. Testing Materials and Scoring									
4. Project Administration sal.									
5. Books									
6. Special Equip.									
7. Transportation									
8. Facilities									
9. Administration and Services									
Total									

RIVERSIDE UNIFIED SCHOOL DISTRICT

COST EFFECTIVENESS PROJECT

READING AND MATHEMATICS SEVENTH-GRADE-CENTRAL

Dates of Report _____ (Report in minutes) Name of Teacher _____

COMPONENTS		Mon.	Tue.	Wed.	Thu.	Fri.	REMARKS
1. IN CLASS							
A.	LARGE GROUP						
	SMALL GROUP						
	INDIVIDUAL INSTR.						
	LAB WORK						
B.	LARGE GROUP						
	SMALL GROUP						
	INDIVIDUAL INSTR.						
	LAB WORK						
C.	LARGE GROUP						
	SMALL GROUP						
	INDIVIDUAL INSTR.						
	LAB WORK						
D.	LARGE GROUP						
	SMALL GROUP						
	INDIVIDUAL INSTR.						
	LAB WORK						
2. OUT OF CLASS							
	GRADING						
	RECORDKEEPING						
	PREPARATION						
3. RESEARCH & DEVELOPING							

PROCEDURES:

1.) Please record information daily - put in Judy Dawson's mailbox on Friday.
2.) In Section 1 - "IN CLASS" record time IN CLASS room as devoted to these components. Record each class period separately in groupings A-B-C or D.
3.) In Section 2 - "OUT OF CLASS" record time out of classrooms as devoted to these components. Preparation time would be that expended in short range preparation for classroom or lab.
4.) In Section 3 record that time expended in planning, developing, research, investigation, etc., as it relates to long range plans for improvement of the program or course.

METHODOLOGY

The heart of the methodology for assessing cost effectiveness is the model used to conceptualize the problem and to specify and define the factors involved. The Committee heard a number of reports in the area of models and modeling and reviewed a number of specific models. An introduction to modeling and two specific models will be presented in this report that represent the direction of the thinking taken by the Committee, and a summary type report will outline the requirements of a model and the steps required to complete the model suggested by Mr. Ginsburgh. Other reports and models may be found in the permanent files of the Committee.

The introduction to modeling was presented by Dr. William McCormick at the meeting of the Committee on December 21, 1970. It was in the form of an assessment of the current status of the Committee in relation to the work plan and directions in which to move in the future.

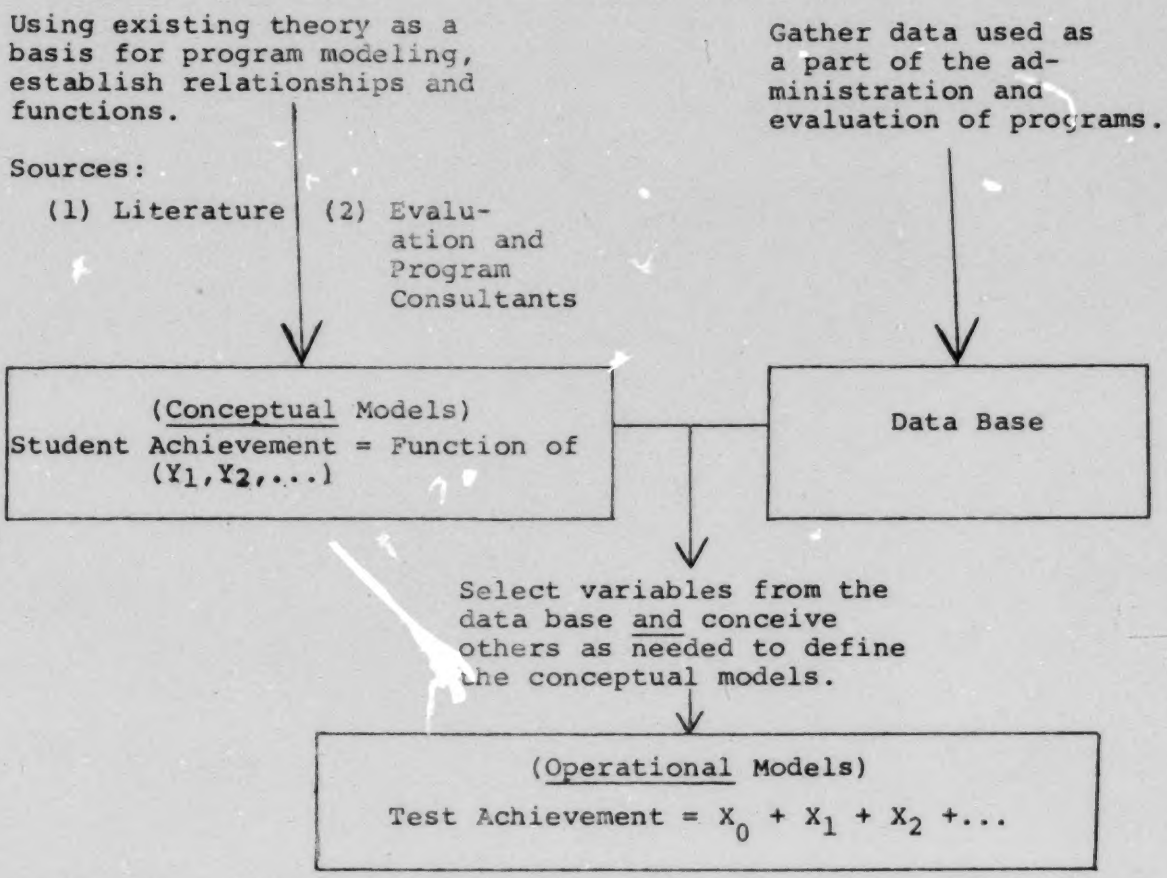
BEST COPY AVAILABLE

1. Revision of the Master Plan

Dr. McCormick stated that the Committee's Master Plan is a well thought-out plan which has served us well and will continue to do so. He recommended two revisions at this time: (1) the two sub-committees presently active (Scaling and Measurement) should try to advance the date, by one month, for their concluding reports (to January and February); (2) the Model Planning Sub-committee should be appointed and start their work now.

Two benefits are expected: (1) the sub-committees would be three months behind the master plan, rather than four; and (2) the needs of the Model Planning Sub-committee could help focus the efforts of the other two sub-committees. Rather than being three independent groups, the task of each depends upon the direction taken by the other. In particular, different kinds of models (and their purposes) may require different sets of dependent and independent variables (the concern of the Measurement and Scaling Sub-committees).

2. The Process of Modeling the Compensatory Programs


Using existing theory as a basis for program modeling, establish relationships and functions.
Sources:
(1) Literature
(2) Evaluation and Program Consultants
Gather data used as a part of the administration and evaluation of programs.
(Conceptual Models)
Student Achievement = Function of (Y1, Y2, ...)
Data Base
Select variables from the data base and conceive others as needed to define the conceptual models.
(Operational Models)
Test Achievement = X0 + X1 + X2 +...

3. Two General Approaches to Modeling

There seem to be two general approaches for consideration. Should the efforts be (1) conclusion oriented or (2) decision oriented? The former is more open and free to explore interesting relationships while the latter is more closed or limited to the requirements of decision makers.

a. Conclusion oriented models are often used for investigation of the relative effects of several forces which in unison determine the level of output. Such a model can also be used to predict an output (expected level of achievement) for a unit of analysis (say a school).

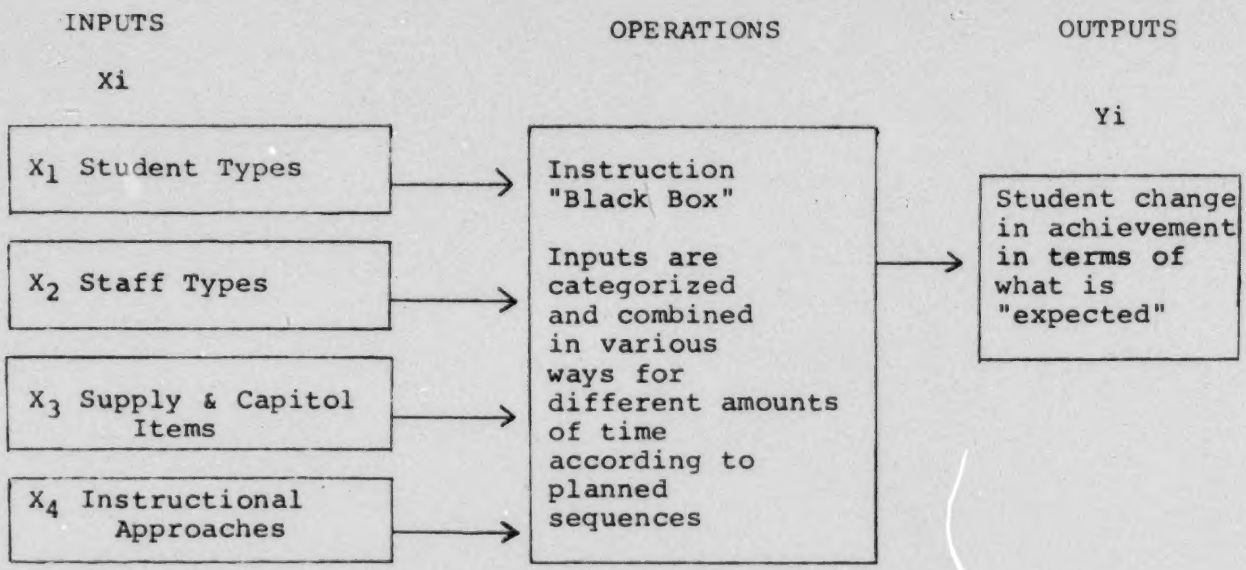
Such models can include many factors that are known (on basis of research) to contribute to student achievement; such as measures of the student's past learning rate and motivation, and the quality and intensity of his learning program. These are factors that are said to predict his achievement.

b. A decision oriented model may include a considerable number of factors but they are included for the purpose of increasing the precision of the conclusion; that is, the model's purpose is to indicate which practice is "best" given the other information in the model.

These models can be limited to a very few (one even) factors and achievement can be contrasted for each alternative. Comparability is achieved by random selection of projects to study. The rationale is that all other causal factors are represented equally, and any test differences between each program alternative is due to program differences.

For example, if the question was whether teacher aid programs were more cost effective than reading specialist ones, a random selection of each kind of project could be studied. Using equal cost levels, a random selection of each type of program could be contrasted to see which had greater gains in student performance. A decision could then be reached, recommending the program with the greater gains per level of cost.

4. An Example of a Conclusion-Oriented Approach


INPUTS
Xi
OPERATIONS
OUTPUTS
Yi
X1 Student Types
X2 Staff Types
X3 Supply & Capitol Items
X4 Instructional Approaches
Instruction "Black Box"
Inputs are categorized and combined in various ways for different amounts of time according to planned sequences
Student change in achievement in terms of what is "expected"

Model equation
(X_o is the Y intercept) $Y=X_o+X_1+X_2+X_3+X_4+E$

"Modeling" starts with stating a system of theoretical relationships. Measures must then be selected to describe the inputs, operations and outputs. The degree of controlability of operations must be specified; in addition, the decision-making process must be defined in terms of resource acquisition and allocation.

Expected benefits: Answers to the question of how much "bang" for a buck (achievement gain for a dollar invested) for a particular school input, after controlling for the others.

5. An Example of a Decision-Oriented Approach (Analysis of Variance)

		X_2 Instructional Strategy		
		Traditional	Diagnostic-Prescriptive	"Other"?
Xi LEVELS OF COST	Hi			
	Medium			
	Lo			

Model Equation $Y=X_o + X_1 + X_2 + E$

Achievement = The overall average + the level of cost + the instructional strategy + error (includes unknown factors).

Units of analysis (children or schools) are randomly selected and sorted into the cells indicated above. Using the average achievement and variance derived for each classification, the unique contribution of each factor (level of cost and instructional strategy) is calculated.

Expected benefits: An answer to the question of which instructional strategy (of the two chosen) has the greater achievement associated with it, for a given level of cost.

6. The Mission and Constraints of the Committee

The Committee is to recommend to the State Board of Education a methodology for evaluating the cost effectiveness of compensatory programs. It is important for us to consider its use; i.e., projects with low ratings are to be modified to produce a higher degree of program and cost effectiveness. Methodology that allows only a rating scheme will not provide information for the purpose of modifying projects which are given low ratings. Yet, it seems that the Committee should be concerned with models (methodology) which will provide the required information.

Of course other groups are seeking ways to determine the effectiveness of school programs (and their costs). They include the State Department of Education, the Advisory Committee for PPBS, the State Committee on Goals and Evaluation, the Innovative Schools Act (AB 416), and the Legislative Analyst's Office.

The Committee is restricted to convincing the Department of Education of the wisdom in expending its resources for cost effectiveness work (the 900 account) in the manner the Committee thinks best.

7. Determining Project Effectiveness

We can measure directly the performance of the student in reading and mathematics, but not that of the contribution of school efforts; that is, the unique effects of experienced staff and instructional techniques (such as phonetics). Rather, these must be inferred from the empirical analysis of results obtained by different combinations of instructional staff and techniques working in comparable circumstances.

Estimates of the effectiveness of educational projects must be relative to particular circumstances which individual schools, in the short run, are unable to change (the learning rates and style of the students and the physical characteristics of the plant). If students in school "1" are

performing at 25 percent above the average for schools in classification "A," based upon "hard to change circumstances," the school efforts may be considered comparable to those in school "2" whose students are performing at 25 percent above the average for schools in classification "B."

It follows that a project which has the same relative position in the distribution of schools which have similar characteristics as that of another project (which may be from a group of schools with different characteristics) could be assumed to have the same degree of effectiveness. In other words, effectiveness must be in terms of the performance which can be reasonably expected, given the known circumstances of a project which limit the range of student achievement.

8. Tentative Committee Output

From a topology of schools, develop a profile for each classification showing "expected values" (mean achievement and variance) for school factors; i.e., inputs, processes used and cost levels. For example, by choosing combinations of school inputs that are alike, the student achievement associated with each level of cost could be determined (a norming procedure).

Develop a prediction model, incorporating "hard to change" elements (including costs). Schools with higher than predicted outputs are said to be more cost effective (a rating scheme).

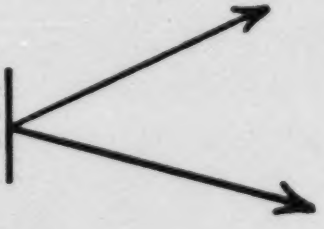
Develop an explanatory model - In addition to "hard to change" elements, the model could include elements that can be changed; i.e., types of staff, equipment and techniques. The purpose would be to determine the marginal effect of the program elements in terms of cost effectiveness (information for the purpose of modifying projects).

9. Output Measures for Modeling Overall Project Effectiveness

Traditional testing measures where an individual student is in terms of a hypothetical national population. The dimensions measured are very broad, such as reading achievement (with subcategories of paragraph meaning and work meaning). It is the current practice of compensatory programs to aggregate these measures of individuals for use in assessing the overall effectiveness of individual projects.

Traditonal Tests

The Stanford Achievement Test is an example of an output measure for State reading programs



Dr. McCormick suggested the Measurement Sub-committee might assume these conventional tests, when appropriately weighted on the basis recommended by the Scaling Sub-committee, could form part of the basis for rating the cost effectiveness of individual projects.

10. Output Measures for Modeling the Effectiveness of Specific School Practices

Study by the Measurement Sub-committee shows two newer purposes for testing: (1) measuring student performance (diagnosis) for the purpose of assigning treatment, and (2) assessing the effectiveness of the educational treatment prescribed. Both require measurement (criterion-referenced) in terms of student performance according to "instructional objectives."

Criterion-Referenced Tests

Student performance based upon narrow dimensions of what the school is trying to do is used in schools for planning and evaluating reading instruction.

Dr. McCormick feels that attempts to use traditional testing for these newer purposes seem doomed to failure because such tests were constructed for other purposes. Further, according to measurement specialists, the tests are not sensitive to teaching strategies.

Compensatory projects presently use performance objectives (student-referenced) for planning instructional strategies but not for the evaluation of the overall effectiveness of the program. Dr. McCormick recommended that the Committee study the feasibility of using criterion-referenced testing for measurement of the effectiveness of specific school practices.

11. A Plan for Developing the Information Necessary for Estimating the Effectiveness of Specific School Practices

In meeting with the Sub-committee on Measurement, Dr. Garth Sorenson (UCLA) suggested a plan which Dr. McCormick feels may be effective for obtaining the information needed for revising projects which have been rated low in effectiveness.

Such a plan should include the following elements:

1. A set of criterion-referenced tests (together with a set of rules for selecting these tests). A criterion-referenced test measures the intellectual skills the teacher is trying to teach. They will be used in (a) measuring what the student knows at the beginning of the

course, (b) to check the effectiveness of individual lessons, (c) to check what the student knows at the end of the course.

2. A set of repeatable instructional procedures designed to improve the students' performance on criterion-referenced tests. These will have to provide for differences among pupils in learning speed and motivation. Will need some remedial routines.

3. A set for formative evaluation procedures for testing and improving the instruction tools. Will include (a) a record of each student's progress, (b) monitoring procedures to see that teacher used the instructional program correctly, (c) comparison groups.

Dr. Sorenson's plan requires specialized staff and a great deal of local school cooperation. Such school operations now exist in some school districts and Dr. McCormick feels we should consider ways of channeling resources to help them evaluate specific school practices in terms of their cost effectiveness.

PRESENTATION BY DR. RAY SWEIGERT OF HIS MODEL

Dr. Sweigert said that one way of viewing benefit/cost in relation to PPBS is as follows:

$$\frac{\text{Program Planning}}{\text{Budgeting}} \longrightarrow \frac{\text{Evaluation}}{\text{Accounting}} \longrightarrow \frac{\text{Benefit}}{\text{Cost}}$$

Where Program Planning is considered as the numerator of a fraction and Budgeting as the denominator, Evaluation determines the results of program planning after implementation. Out of Evaluation comes some indication of benefits that were produced by Program Planning. Out of Accounting comes as indication of the actual cost of carrying out this program plan. The benefit/cost formulation is not an evaluation model, but a reporting model. We know more about the accounting part of it than the benefit part. The problem is not determining costs, but determining benefits. The model I have will emphasize benefits, but without both benefits and costs, the whole picture does not emerge. For a unit of measure I picked a very simple one. It is a single student achieving a single learning objective to a criterion level of performance. You add up all instances of a single student achieving a single objective, weighting according to its relative importance and then divide by the commensurate cost.

Following are the elements in the model:

N = Number of students receiving instruction towards achievement of a single objective.

B = Percent of students mastering given objective prior to instruction.

F = Percent of students mastering upon completion of instruction.

F-B = Percent of students who mastered objective during instruction.

$N\ (F-B)_o$ = Number of students who mastered the objective during instruction.

I_{o_t} = the relative weight applied to objective o.

Grade level may be used as a criterion of desired performance. In absence of having any really rational means of setting criteria at the present time, we might as well use grade level.

Putting the above elements together gives us the following benefit/cost index for objective o.

$$\frac{I_{o_t}\ N\ (F-B)o}{C}$$

Such an index should be the focal point of any information to be used in analyzing benefits versus costs.

To add across objectives, we introduce a summation sign $\sum_{o}$

$$\frac{\sum_{o} I_{o_t} N (F-B)_o}{C}$$

To add across groups of students, we introduce a subscript p after N

$$\sum_{o} I_{o_t} N_p (F-B)_o$$

and introduce a second summation sign in the following manner

$$\frac{\sum_{p} \sum_{o} I_{o_t} N_p (F-B)_o}{C}$$ - This is the benefit/cost formula

I feel that if we're going to determine what is going on in education in the State, we are going to have to use something like this in reporting results. The index provides the relative number of units of student benefit per dollar spent.

Dr. Sweigert also cited Hinrichs and his three types of problems volving cost/benefit analysis.

1. The amount of money is fixed, and you want to see how much you can get for that amount of money. Alternatives with different levels of benefit are examined.

2. You have a given objective, a given set of benefits and you want to achieve it at minimum cost. This is generally known as cost effective analysis. Alternatives with different costs are examined.

3. Both benefits and costs may vary. This is the most general situation. Alternatives have different benefits and costs.

The model which was accepted by the Committee for further development was one presented by Mr. Allen Ginsburgh at the meeting of January 21, 1971. It was reproduced here from the minutes of that meeting.

STATUS AND SUBTASK REDEFINITION

An Analysis by Mr. Allen Ginsburgh

In this section, the status of our progress toward a cost effectiveness model will be restated in broad and general mathematical terms. The tasks of our sub-committees in Phase II, Component Studies, will become more clearly focused. This should permit more detailed planning, scheduling and budgeting of these subtasks and, hence, a reevaluation of the overall task.

1. For our purpose, we will consider money spent in Compensatory Educational Programs (particularly Title I, Title III and Miller-Unruh) as directed toward those portions of the student population which statistically are not achieving the same educational progress as the overall population (due to poverty, ethnic differences or otherwise). The programs supported in Compensatory Education are, therefore, intended to achieve additional educational gains in the deprived under-performing populations so as to provide them the necessary background so that they may also achieve the same gains from each educational year as the overall population. The task of our Committee is to measure the cost effectiveness (α) of each program (B) under these specific Acts in making measurable progress. Recognizing the need to make the task more tractable, the Committee has limited itself to consider only gains in reading and mathematics. Then the cost effectiveness of Program B which represents any program sponsored by the Acts (Title I, Title III or Miller-Unruh) is

$$\alpha_B = \frac{\text{Measurable Gains in Reading and Mathematics Achieved by Program B}}{\text{Dollar Cost of Program B}}$$

2. We recognize that there are many measurable attributes which may be considered in gaining improved proficiency in mathematics and reading. These are such things as "word recognition," "word comprehension," "sentence comprehension" in reading, or "counting by rote" and "simple addition" in mathematics. We have been given samples of these as lists of detailed instructional objectives.

   We must now compile and adopt a set of these "Detailed Instructional Objectives" which are individually measurable and which, in total, describe what we mean by the "reading skill" and the "mathematical skill." For purposes of notation, we will call

(a) = A representative "measurable instructional objective."

We are going to measure the (a) capability in a population by a test before we submit the population to Program B and identify the result as (a_I). We are going to retest the population again for this same measurable instructional objective after we have conducted Program B and identify the result as (a_{II}). The improvement in this specific "measurable instructional objective" due to Program B is

$$(a_{II}) - (a_I).$$

Above, we identified a number of such "measurable instructional objectives" which we can identify as a_1, a_2, a_3, etc., up to an amount to be determined which will describe what we mean by the totality of the reading and mathematics skills. For convenience, we will refer to any one of these as the (i)th one and consider for a population of (n) students that

$$n\,(a_{II} - a_I) = \Delta\ Bi$$

as the total improvement in (i)th detailed instructional objective due to Program B. ((i) is the index of a measurable instructional objective.) The identification of all of the "measurable instructional objectives" of interest to us is a task of our Objectives Committee.

3. The manner in which we measure Δ_{Bi} is the task of our Methods Sub-Committee. We must choose or devise a test or set of tests which measure $(a_{II})_{Bi}$ and $(a_I)_{Bi}$ so that we can determine each Δ_{Bi} which is important to us in determining the effectiveness of Program B.

4. We now recognize that the success of any given educational program such as Program B is strongly dependent on the characteristics of the population taught and the environment in which it is taught. Typical of population variables of interest are "ethnic distribution," "teacher density," "family economic status," and "distribution of mother tongue." Environmental factors could include "teacher skill and attitude," "school administration attitudes," "classroom lighting" and a host of others. These two sets of variables must first be redefined into a set which we can measure quantitatively and those which cannot be so treated. We will call

g = a test population <u>measurable</u> characteristics

e = a test population <u>non-measurable</u> characteristics.

We know that there are a number of each so we will establish

j = index of test population measurable characteristics

l = index of test population non-measurable characteristics

so that we can discuss how we intend to treat each g_j and each e_1.

Our Scaling Sub-Committee has the task of identifying these characteristics, dividing them between the g_j and the e_1 and assuring that they are statistically significant.

5. The same program, Program B as example, will result in different effectiveness, dependent upon the population variables just discussed. If we are to compare the effectiveness of different programs with different population and environmental circumstances, it will be necessary to establish a functional relationship describing the effect of each measurable variable (g). These functional relationships we will describe as F(g); i.e., some yet to be defined relationships involving (g). In general, we must expect that there will be a different function for each (g_j), although future studies may simplify matters. Therefore, we write $F_j(g)_j$ to infer this difference. Not only that, but we must allow that each (g_j) may act differently with each (a_i). So to be general, we must write this function of (g) as $F_{ij}(g_j)$.

Each test population will affect each (a_1) through all (g_j) of significance. It is our thought that this effect may be multiplicative rather than additive because of the inter-relationship (i.e., ethnic effects will be greater when economic effects also exist). As a result, we will tentatively choose to operate on each Δ_{Bi} with the product of all $F_{ij}(g_j)$.

This product is written

$$\pi_j \ (F_{ij} \ (g_j) \ )$$

This functional product of the effect of the measurable statistically significant characteristics of the population and environment, effectively changes the scale by which we measure the gains obtained in each measurable instructional objective (a_i) through the application of Program B to this test population. The gain in each (a_i) is then

$$\pi_j \ (F_{ij} \ (g_j) \ ) \ \Delta_{Bi}$$

and the total measurable gain in reading and mathematics achieved by Program B

$$\sum_i \ \pi_j \ (F_{ij} \ (g_j) \ ) \ \Delta_{Bi}$$

with the exception that we have not accounted for any non-measurable characteristics $(e)_1$ which we might find to be of significance.

For the moment, we will assume that we can statistically null out the effect of the $(e)_1$ by choice of the test populations used for the evaluation of Program B. This may be handled through the procedural task planned within Phase III, the Modeling Phase of the total effort. We then can rewrite the numerator for our cost effectiveness relationship as

$$\sum_i \pi_j \left(f_{ij} \left(g_j\right)\right) \Delta_{Bi} \Big|_{\text{Null}\quad e_1}$$

6. The program costs will be made up of the summation of all of the cost elements identified on the program. These cost elements, (c), include cost of teachers, cost of teachers' aids, cost of constructional material, etc. If we identify (m) as an index of this parameter, then the total cost is

$$\sum_m \quad C_m$$

7. The total expression becomes

$$\alpha_B = \frac{\sum_i \pi_j \left(F_{ij}(g_j)\right) \Delta_{Bi} \Big|_{\text{Null } e_1}}{\sum_m \quad C_m}$$

In summary, our task is to:

1. Identify all of the "measurable instructional objectives" (a_i) making up competence in reading and mathematics.

2. Identify or otherwise obtain one or more tests which measure these measurable instructional objectives.

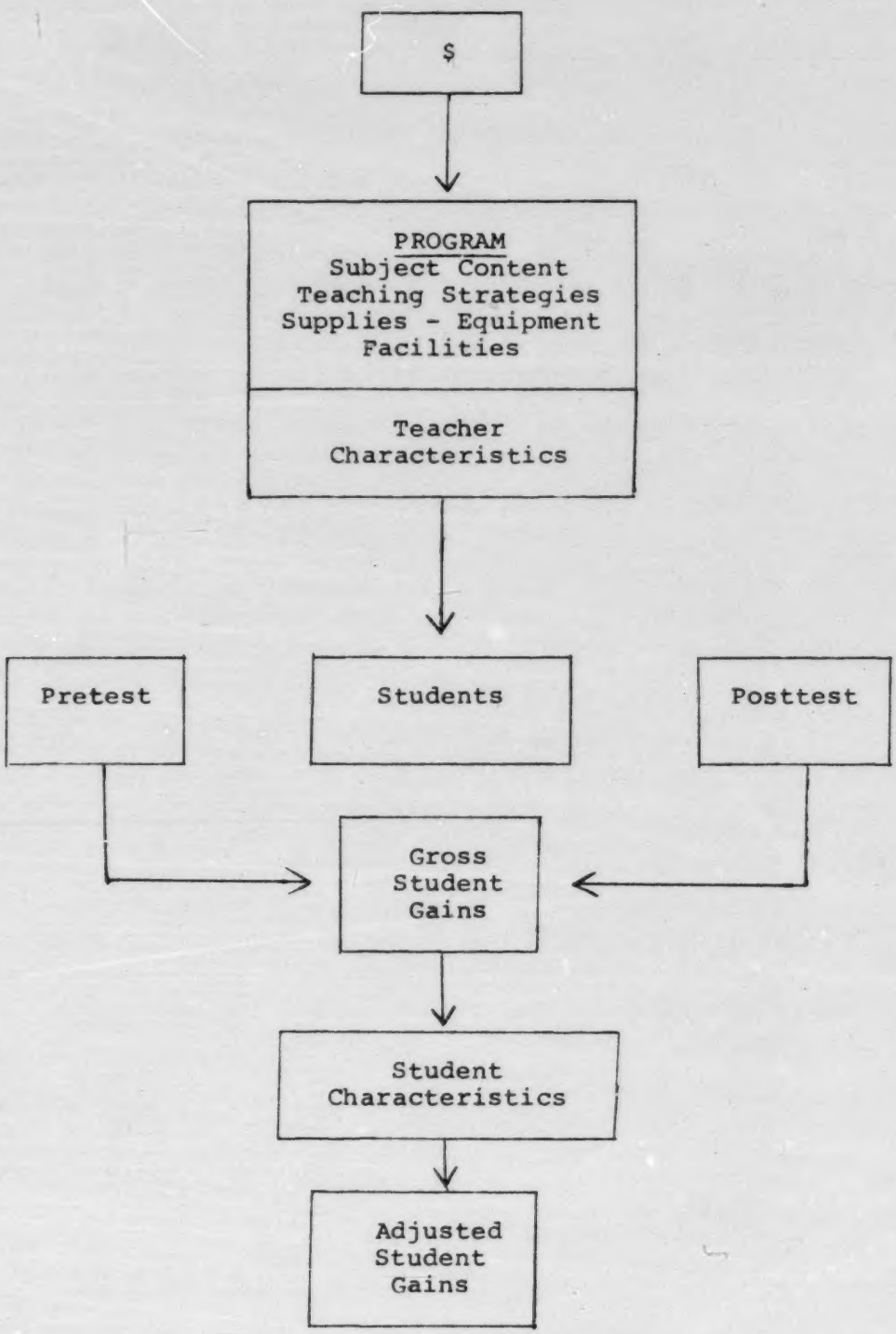
3. Identify all statistically significant test population and test environmental characteristics and divide them between those which are measurable (g_j) and those which cannot be feasibly measured (e_1).

4. Determine the functional relationship of the measurable statistically significant "test population and test environmental characteristics" (g_j) upon each of the measurable instructional objectives (a_i).

5. Identify all cost elements of the Program.

These tasks must now each be more fully programmed, scheduled and budgeted.

A block diagram of Mr. Ginsburgh's model could look like this:



At the meeting of December 9, 1971, Mr. William Bronson gave an overview of modeling in terms of the steps that are necessary to develop a model, and then indicated how the work to date on Mr. Ginsburgh's model matched the required steps.

Presentation by Mr. William Bronson to Committee December 9, 1971

Steps in Model Building

1. State hypothesis or hypotheses on which the model is to be based.

2. Identify the elements that seem to have a relationship to the problems to be dealt with in the model.

3. For each of the elements identified in step #2, describe its relationship to the other elements or to the total model.

4. Describe each of the elements in quantifiable terms.

5. State in mathematical terms (formula) the relationship described in step #3.

6. Insert values for each element in the formula and check the results for face validity.

7. Change input data and predict the new output. If hypotheses are sound and model is valid, calculated changes of input should produce predictable changes of output.

8. Field test and validate.

An Evolving Model from the Committee on Cost Effectiveness Hypotheses

(These hypotheses were implied from Mr. Ginsburgh's model and reflect the beliefs of the Committee in regard to the methodology for assessing cost effectiveness)

1. It is possible to compare programs with similar objectives and determine both the relative costs and the relative effectiveness of the programs.

2. Programs may be ranked according to relative costs or by relative effectiveness or by a cost-effectiveness ratio.

3. With a given program, it is possible to predict the varying impact (effectiveness) of that program on student populations of varying backgrounds or characteristics.

4. It is possible to predict the relative impact a program will have when implemented by teachers with varying backgrounds or characteristics.

5. It is possible to identify successful programs and to replicate those programs in other districts.

6. When replicating a given program, it is possible to predict the effectiveness of that program with students of varying characteristics when implemented by teachers with varying characteristics.

Elements that Seem to Relate to the Hypotheses

1. Objectives.

2. Measurement devices.

3. Program description.

4. Student characteristics.

5. Teacher characteristics.

6. Program costs.

Relationship of Elements

1. Objectives of different programs must be the same if the results of different programs are to be compared.

2. The same or equivalent measuring devices must be used when comparing the results of different programs.

3. Program content, teaching strategies and other program descriptions are required for the replication of a program but not for the measurement of the end results.

4. There are factors in the backgrounds and experiences of student populations that will enhance or inhibit their ability to profit from exposure to educational programs.

5. There are factors in the backgrounds, training and experiences of teachers that will enhance or inhibit their ability to successfully implement particular educational programs.

6. There are factors in the backgrounds, training and experiences of teachers that will enhance or inhibit their ability to be successful with particular groups of students.

7. In comparing program costs, the same items must be used and the basis for calculating costs must be the same in order to make valid cost comparisons of different programs.

DESCRIPTION AND QUANTIFICATION OF ELEMENTS

1. OBJECTIVES MUST INCLUDE:
   - a. SUBJECT AREA
   - b. GRADE LEVEL
   - c. LENGTH OF TREATMENT (MONTHS)
   - d. EXPECTED OUTCOMES
     - (1) GAIN IN MONTHS
     - (2) GRADE PLACEMENT LEVEL
     - (3) SPECIFIED SCORE ON CRITERION REFERENCED TEST
     - (4) OTHER SPECIFIC MEASURE

2. MEASUREMENT DEVICES MUST INCLUDE:
   - a. NAME OF INSTRUMENT
   - b. FORM, PUBLICATION DATE, ETC.
   - c. KINDS AND FORM OF OUTPUT

3. PROGRAM DESCRIPTORS:
   - a. ALL ITEMS NEEDED FOR REPLICATION
     - (1) COURSE CONTENT
     - (2) LEVEL OF PHYSICAL FACILITIES, SUPPLIES, EQUIPMENT
     - (3) STAFFING REQUIREMENTS; TEACHERS, AIDES, SPECIALISTS, ADMINISTRATORS
     - (4) LEVEL OF SUPPORTING SERVICES
     - (5) STAFF DEVELOPMENT REQUIREMENTS
   - b. NO ITEMS NEEDED FOR COST EFFECTIVENESS FORMULA

4. STUDENT CHARACTERISTICS

   a. LISTING OF RELEVANT CHARACTERISTICS

   b. WEIGHT INDICATING RELATIVE INFLUENCE ON RESULTS

5. TEACHER CHARACTERISTICS

   a. LISTING OF RELEVANT CHARACTERISTICS

   b. WEIGHT INDICATING RELATIVE INFLUENCE ON RESULTS

6. PROGRAM COSTS

   a. FORM IN WHICH COST GOES INTO FORMULA

      (1) TOTAL COST

      (2) COST PER STUDENT

      (3) OTHER (SPECIFIED)

   b. ITEMS TO BE CONSIDERED

      (1) (SEE FINAL REPORT OF SUB-COMMITTEE ON COSTS)

   c. METHOD OF DETERMINING EACH ITEM

   d. METHOD OF CALCULATING FINAL FIGURE FOR FORMULA

POTENTIAL BENEFITS

The potential benefits to education that could result from the completion of the methodology started by this Committee would include the capability to make decisions based on:

1. The relative cost effectiveness of programs with the same objectives when a cost effectiveness index has been developed.

2. Objective data related to costs of programs and program elements.

3. Objective data related to the effectiveness of different programs with the same objectives.

4. The impact of a program on different student populations.

5. Staffing requirements in terms of teacher characteristics, skills or teaching styles required.

6. The evaluation of different instructional strategies.

7. The results of replicating successful programs or program elements in other locations.

We may speculate that the impact of these improved decision making benefits upon the institution of education in the United States could be dramatic.

School administrators and teachers will have available more discrete tools as suggested in items 2 through 6 with which to both develop and monitor their various programs. Their potential to do a better job and to more effectively adjust to the desires and needs of the public will increase.

The confidence of taxpayers, parents and their elected representatives in education may grow through a clearer understanding and better documentation of what happens. Clearer descriptions of what our youth are learning, how they are learning it, and how efficiently the educational dollar is used are all prerequisites for increased public support of education. Elements of this methodology such as items 3 through 7, when incorporated into our institutional efforts to train teachers, may increase dramatically the instructional effectiveness of teachers.

The kinds of information generated through the development of concepts in items 3, 4, 5 and 6 may produce a far more detailed and valid approach to objective teacher evaluation than has been possible before.

These potential benefits: (1) greater public support of education; (2) improved teacher training; and (3) more effective teacher evaluation, are among the most significant that could accrue to the whole enterprise of education.

BIBLIOGRAPHY

(Books and Pamphlets)

Abt Associates, Inc. Design for an Elementary and Secondary Education Cost Effectiveness Model. Williamsville: Western New York School Study Council, 1968.

Alkin, Marvin C. Evaluating the Cost Effectiveness of Instructional Programs. Los Angeles: University of California, Center for Study of Evaluation, May 1969.

Burkhead, Jesse. Input and Output in Large City High Schools. Syracuse, New York: Syracuse University Press, 1967.

Carpenter, M. B., and Sue A. Haggert. Analysis of Educational Programs Within a Program Budgeting System. Santa Monica: Rand Corporation, September 1969.

Carpenter, Margaret B., and Sue A. Haggert. Cost Effectiveness for Educational Planning. Santa Monica: Rand Corporation, March 1970.

Clowes, Richard M. The Relationship of Cost and Reading Achievement in Los Angeles ESEA Title I Reading Programs, 1968-69. Los Angeles: County Superintendent of Schools Office, 1969.

Committee on Government Operations. Criteria for Evaluation in Planning State and Local Programs. United States Senate, 90th Congress. July 21, 1967. Washington, D.C.: Government Printing Office, 1967.

Curtis, William H. Educational Resource Management System. Chicago: The Research Corporation of Association of School Business Officials, 1972.

Dorfman, Robert. Measuring Benefits of Government Investments. Brookings Institute, Washington, D.C., 1965.

Dougharty, Laurence A. and others. Education Cost Model for the State of California. Santa Monica: Rand Corporation, January 1971.

Edding, Friedrich. Methods of Analyzing Educational Outlay. New York: UNESCO Publications Center, 1966.

ERIC Clearinghouse. ERIC Abstracts: A Collection of ERIC Resumes on Program Budgeting and Cost Analysis. Washington, D.C.: American Association of School Administrators, 1970.

Feshback, Norma D. Variations in Teachers' Reinforcement Style and Imitative Behavior of Children Differing in Personality Characteristics and Social Background. Center for the Study of Evaluation. Los Angeles: UCLA, February 1967.

Fisher, G. H. Cost Considerations in Systems Analysis. New York: American Elsevier Publishing, 1970.

Fisher, G. H. The Role of Cost-Utility Analysis in Program Budgeting. Santa Monica: Rand Corporation, September 1964.

Goldman, Thomas A. Cost Effectiveness Analysis. New York: Praeger Publishing, 1967.

Igoe, Joseph. The Development of Mathematical Models for the Allocation of School Funds in Relation to School Quality. Doctoral Dissertation, Utah State University. Ann Arbor: University Microfilms, 1969.

Keller, John E. and others. Possible Contributions of Program Budgets and Cost-Benefit Analysis to California School System Management. Berkeley: University of California, January 1968.

Kiesling, Herbert J. The Relationship of School Inputs to Public School Expenditures in New York State. Santa Monica: Rand Corporation, October 1969.

Knezevich, Stephen J., ed. Instructional Technology and the School Administrator. See Chapter 5, "The Administrator and Instructional Technology: What Questions Should be Asked? Washington, D.C.: American Association of School Administrators, 1970.

Legislative Analyst. Progress Report: Fiscal Review and Analysis of Selected Categorical and Education Programs in California. (Chapter 784, Statutes of 1969-AB 606, Pursuant to:) Sacramento, Claifornia, April 21, 1970.

Miller, James L., Jr. State Budgeting for Higher Education: The Uses of Formulas and Cost Analysis. Michigan Governmental Studies No. 45. Ann Arbor: University of Michigan, 1964.

Mood, Alexander M. and Richard Powers. Cost Benefit Analysis of Education. Washington, D.C.: U. S. Office of Education, 1967.

Morris, Lee R. Cost Effectiveness: The Current State of the Art. Unpublished Doctoral Dissertation, Harvard University, 1967.

Novick, David. Efficiency and Economy in Government Through New Budgeting and Accounting Procedures. Santa Monica: Rand Corporation, 1954.

Raichle, Henry F. Cost Utility Analysis of a Selected Post-Secondary Educational Program. Doctoral Dissertation, Columbia University. Ann Arbor: University Microfilms, 1968.

Rapp, M. L., G. L. Brunner, and E. M. Scheuer. An Evaluation Design for San Jose Unified Compensatory Education Program. Santa Monica: Rand Corporation, May 1969.

Rapp, M. L. and G. C. Summer. Evaluation of Project R-3, San Jose, California, 1970-71. Santa Monica: Rand Corporation, July 1971.

Riverside Unified School District. Behavioral Objectives and Criterion-Referenced Tests for Seventh Grade Reading. Riverside, California: Central Junior High School, Riverside, September 1971.

Temkin, Sanford. A Comprehensive Theory of Cost Effectiveness. Philadelphia: Research for Better Schools, 1970.

Washington Operations Research Council. Analysis for Planning, Programming Budgeting. Second Cost Effectiveness Symposium, 1968.

(Articles)

Barro, S. M. "Modeling Resource Utilization in a School District," in Sue A. Haggert, et al, Program Budgeting for School District Planning: Concepts and Application. Santa Monica: Rand Corporation, November 1969.

Black, Guy. "System Analysis in Government Operation." Management Science, Vol. XIV, October 1967.

Coarse, R. H. "The Problem of Social Cost," Journal of Law and Economics, October 1960.

Eckstein, Otto. "A Survey of the Theory of Public Expenditure Criteria," Public Finance: Needs, Sources and Utilization. Princeton: Princeton University Press, 1961.

Hitch, Charles J. "An Appreciation of System Analysis," Journal of the Operations Research Society of America, November 1955.

Hoepfner, Ralph. "Characteristics of Standardized Tests as Evaluation Instruments," UCLA-CSE Evaluation Comment. September 1971. (Volume 3, No. 1)

Hoos, Ira R. "A Critique on the Applications of Systems Analysis to Social Problems," Commercial Utilization of Space, May 1967.

Mandansky, Albert. "Uncertainty," in E. S. Quade and W. I. Boucher (eds.) Systems Analysis and Policy Planning: Applications for Defense. Santa Monica: Rand Corporation, June 1968.

Prest, A. R. and R. Turvey. "Cost Benefit Analysis: A Survey," Survey of Economic Theory, Volume III, St. Martin's Press, New York, 1966.

Wildavsky, Aaron. "The Political Economy of Efficiency: Cost Benefit Analysis, System Analysis, and Program Budgeting," Public Administration Review. Volume XXVI, No. 4, December 1966.